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South Pacific bulletin

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The South Pacific Commission

The South Pacific Commission is an advisory and consultative body set up in 1947 by the six Governments responsible for the administration of island territories in the South Pacific region (Australia, France, the Netherlands, New Zealand, the United Kingdom and the United States of America).

The Commission's purpose is to advise the participating Governments on ways of improving the well-being of the people of the Pacific island territories. It is concerned with health, economic and social matters. Its headquarters are at Nouméa, New Caledonia.

The Commission consists of not more than twelve Commissioners, two from each Government. It normally holds one Session each year. There are two auxiliary bodies, the Research Council and the South Pacific Conference.

There is a Research Council meeting once a year. This may be either a meeting of the full Council, or of one or other of its three main sections, specialising in the fields of health, economic development and social development. Members of the Research Council are appointed by the Commission. They are selected for their special knowledge of the questions with which the Commission is concerned, and the problems of the territories in these fields. The chief function of the Research Council is to advise the Commission on what investigations are necessary. Arrangements to carry out those that are approved are the responsibility of the Secretary-General and other principal officers.

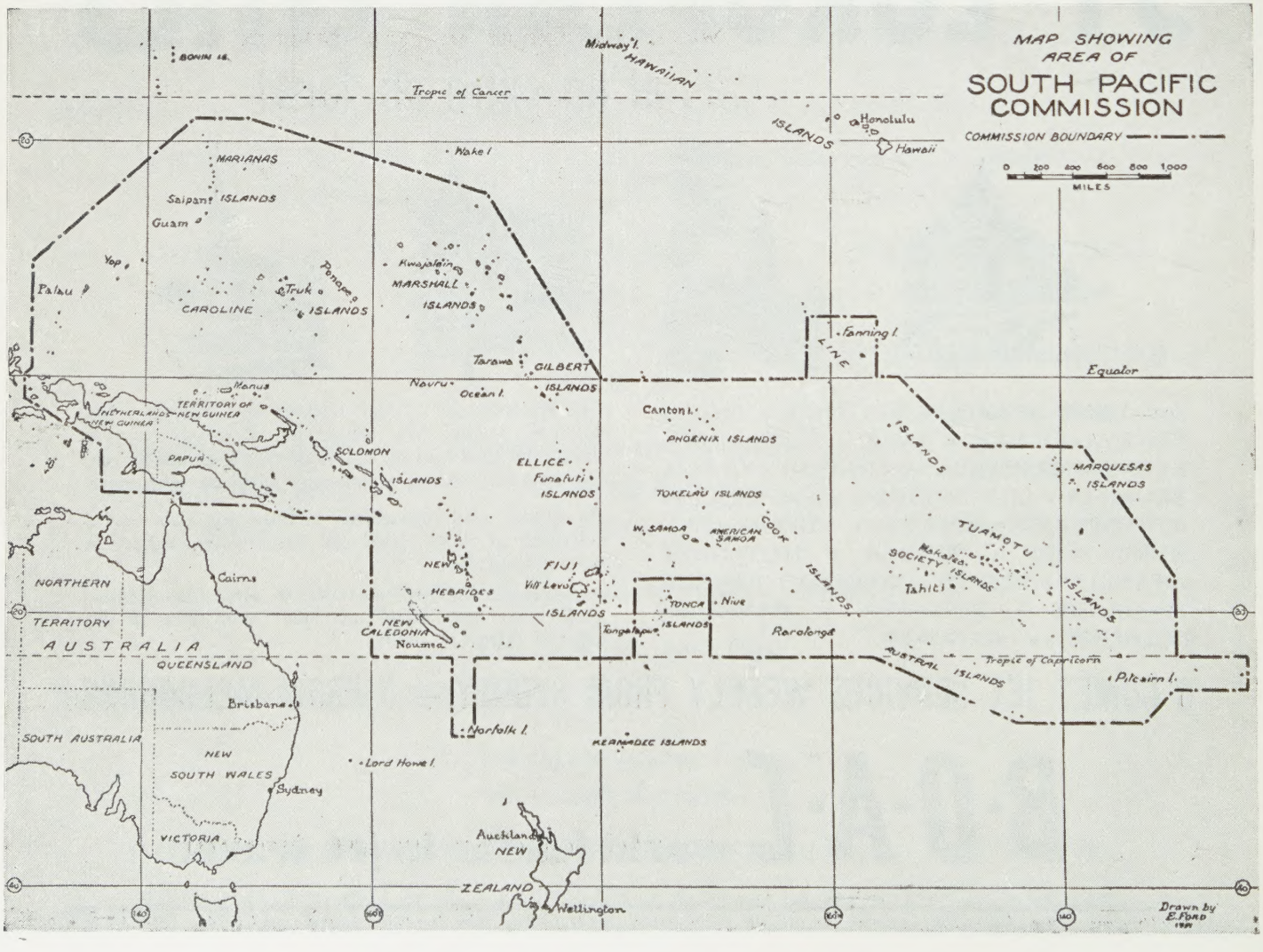
The South Pacific Conference, which meets at intervals not exceeding three years, consists of delegates from the local inhabitants of the territories, who may be accompanied by advisers. The first Conference was held in Fiji in April 1950, and was attended by delegates from fifteen territories and from the Kingdom of Tonga. The second Conference was held at Commission headquarters in April 1953. The third Conference was held in Fiji in April-May 1956, and the fourth Conference in New Britain in April-May 1959.

The principal officers of the Commission are: Secretary-General, Mr. T. R. Smith; Executive Officer for Social Development, Dr. Richard Seddon; Executive Officer for Economic Development, Dr. Jacques Barrau; Acting Executive Officer for Health, Dr. W. Norman-Taylor. The powers and functions of the Deputy Chairman, Research Council, are exercised by the Secretary-General.

Further particulars of the Commission's activities may be obtained from the Secretary-General, Nouméa, New Caledonia.

FRONT COVER PHOTOGRAPH

Nurseryman Stephen Elias tying up a black pepper vine at the Ponape Agricultural Station, a main centre for plant introduction and distribution in the United States Trust Territory of the Pacific Islands, where pepper promises to become an important cash crop. The pepper collection at the station was built up from plant material supplied by the Naduruloulou Plant Introduction Station, Fiji, through the SPC Plant Introduction Service. (See article "Agricultural Development in Micronesia" on page 30.)



SOUTH PACIFIC BULLETIN

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EDITOR: *A. E. Read, B.Sc.*

THE SOUTH PACIFIC BULLETIN, first published in January, 1951, features articles on selected activities in the Commission's three main fields of operation: economic development, health and social development. Articles are also contributed by specialists working in these and related fields, in the territories within the Commission area.

THE BULLETIN is given selective world distribution to people and institutions in widely differing fields sharing a common interest in the purposes and work of the Commission. It is published in two editions, English and French.

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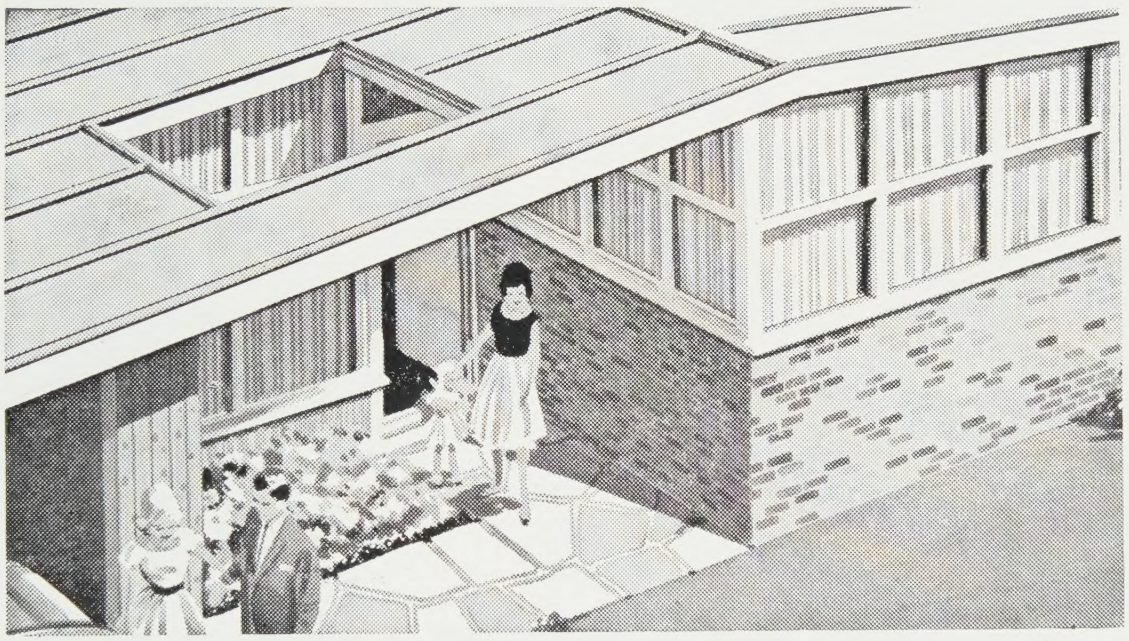

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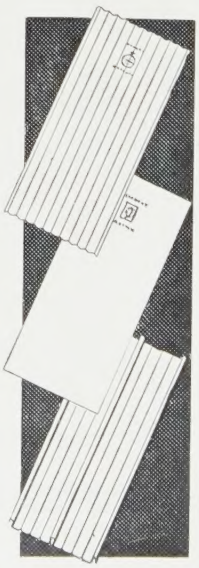

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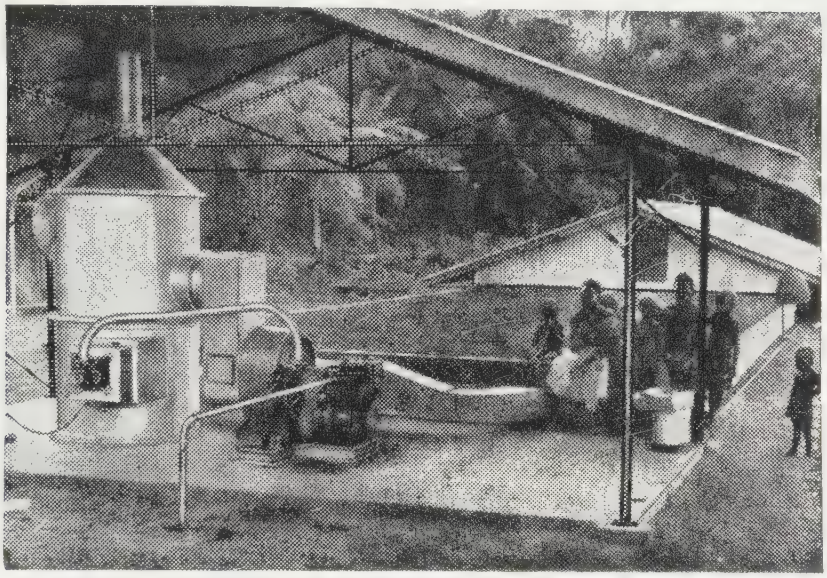

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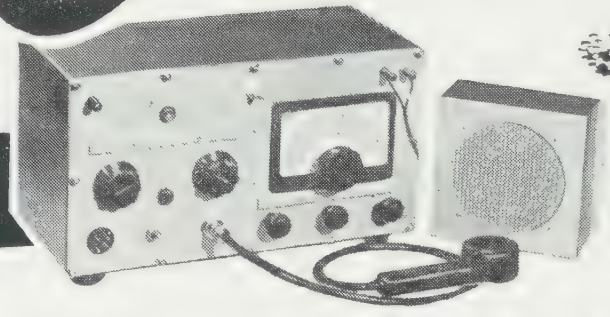

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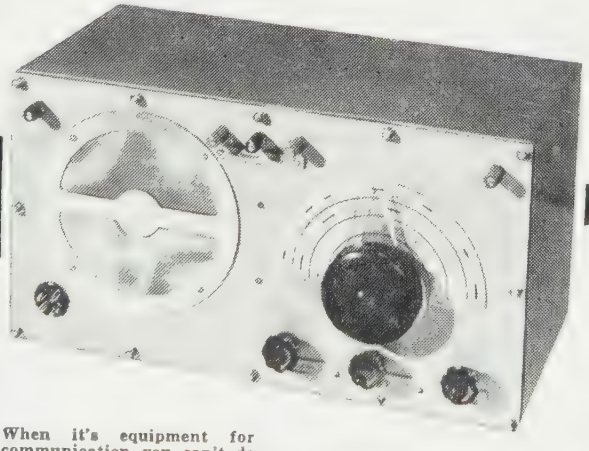

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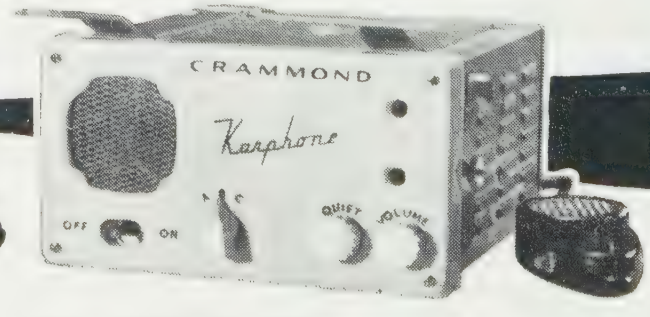

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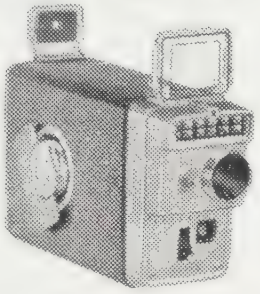

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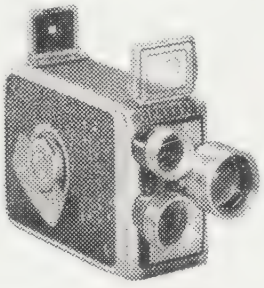

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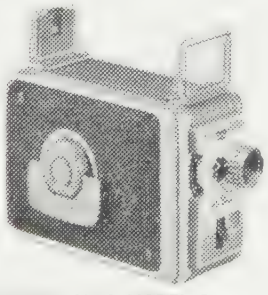

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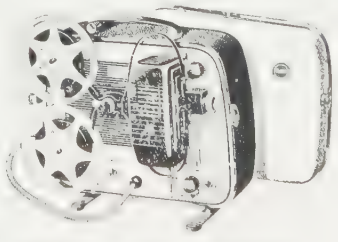

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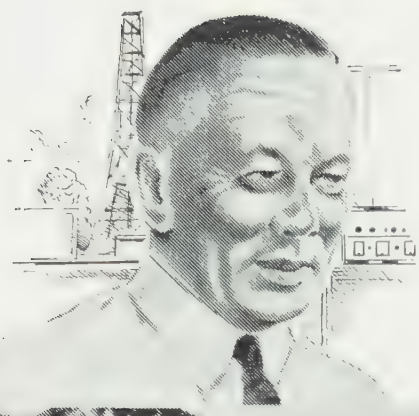

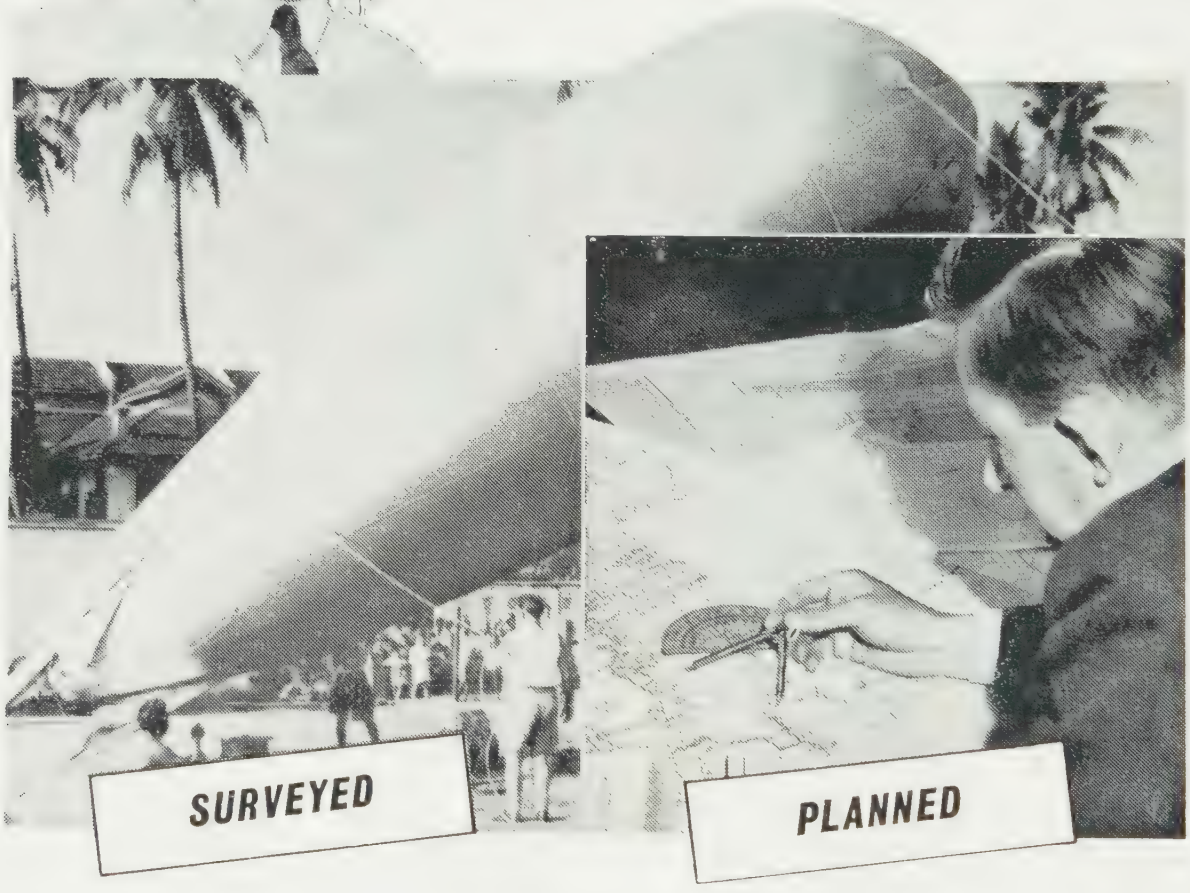

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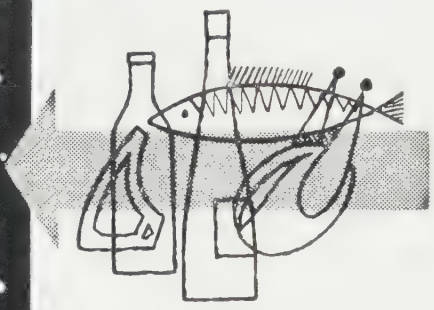

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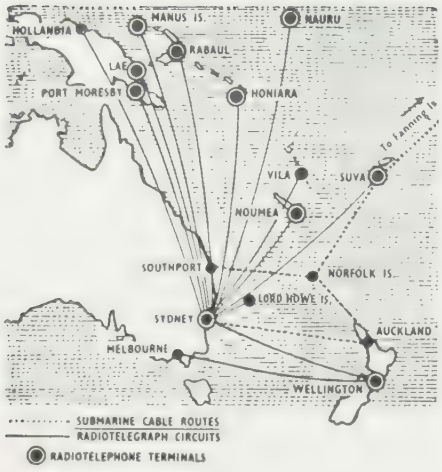

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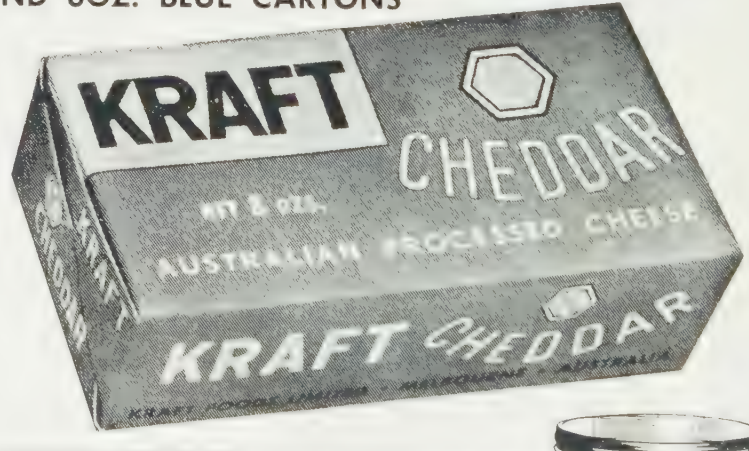

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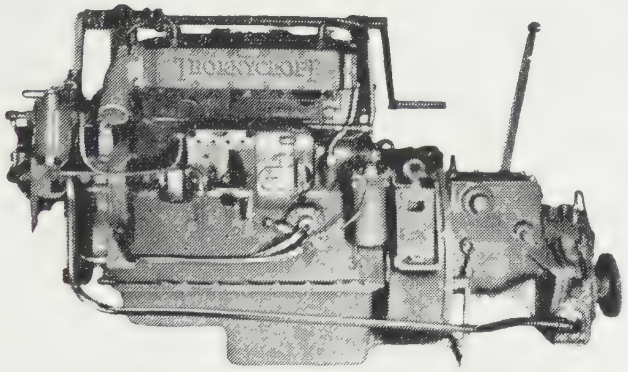

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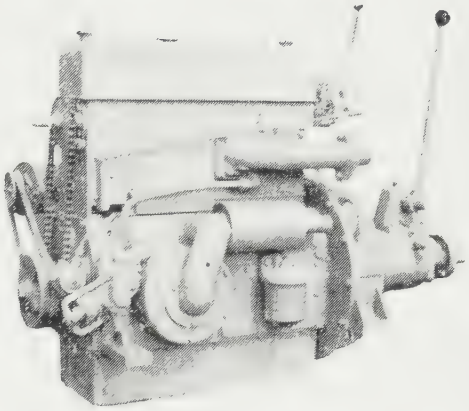

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The author at the special display of Niuean woven ware arranged in a Christchurch department store two days after Niue Island had been devastated by a hurricane in mid-January, 1960. The keen interest taken in the exhibit by customers led to the formation of the Niue Weavers' Association.

Island Handcrafts

Niue Women Run Flourishing Weaving Industry

The Niue Weavers' Association, formed early in 1960, has made excellent progress. Within a year, overseas sales of its woven goods totalled £4,010. The Association was formed at the suggestion of the headmaster of Niue High School, who in the article below tells the story of its founding and subsequent progress.

By ANGUS McBEAN

WELL known throughout the Pacific for the quality of its workmanship and the originality and diversity of its design, the basket-weaving industry of Niue was for many years a major source of income for the island. In recent years, however, the value of woven and plaited ware exported had been steadily declining and in 1958 fell below the £2000 mark for reasons some of which were beyond the control of anyone on the island, such as the competition from plastic bags, the imposition of tariffs in some countries and the partial removal of controls on imports from non-sterling areas in others.

In mid-January 1960, Niue was struck by the second disastrous hurricane within twelve months. The first hurricane in February, 1959, had ruined the island's economy just when copra and banana shipments were slowly building up after a calamitous drought. And now once again, just when the people were within sight of resuming exports, a further crushing blow had fallen. Kumaras and plaited ware were the only possible sources of income from the outside world and, as already mentioned, the basket industry seemed moribund.

At this time the writer was in New Zealand on a month's furlough. With typical but quite overwhelming generosity many Niuean families had presented him with parting gifts in the form of baskets, mats, table mats and other plaited ware in the widest variety. Remembering the great interest shown by all who had seen these articles, the writer thought that by arranging a display somewhere in the city he might be able to obtain some orders which would at least bring a ray of light and hope to a few families.

An Encouraging Response

The manager of the very first shop approached—a large department store—agreed readily to make a corner available, and by eleven o'clock on the day that the news of the second hurricane on Niue reached New Zealand, a large counter had been filled with Niuean basket ware. One hour later, so many orders had been received, and so much interest shown, that the manager expressed his desire to place an open order for £300 worth of assorted woven and plaited ware.

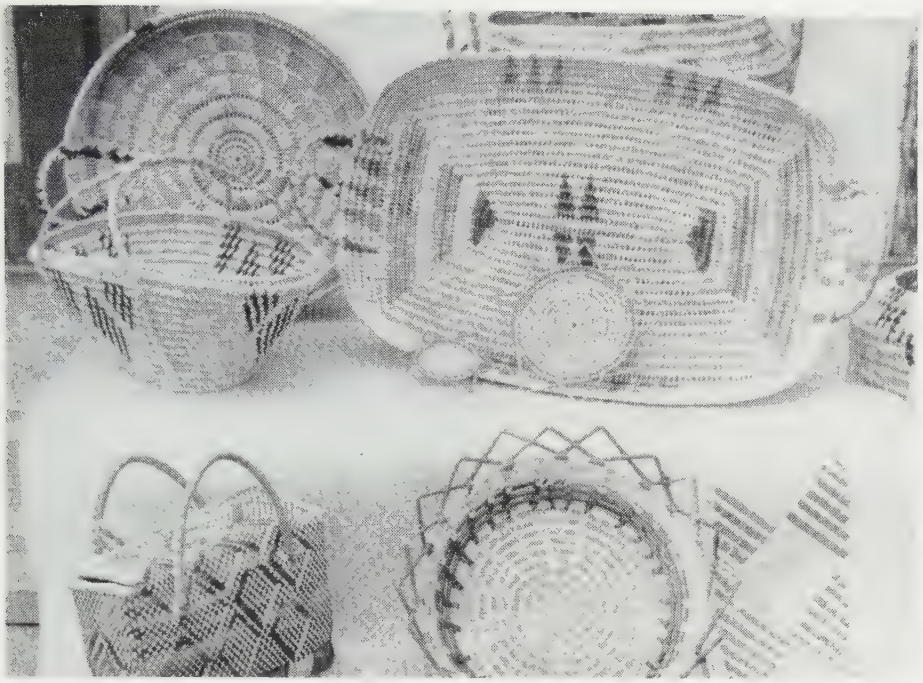
It was in this way that the Niue Weavers' Association was started. A radiogram was immediately despatched to the island advising the women weavers to start preparing pandanus and asking them to be ready to have the details explained to them as soon as the next monthly *Tofua* arrived. Two hours after the vessel anchored, women representing most of the villages attended a first meeting, and by the end of that week a committee of women from every village on the island but one had been formed.

The first few months of the Association's life were filled with anxiety and problems. The writer wished to have the Association run by the Niuean women themselves, yet as "liaison officer" between them and New Zealand business firms, he had to explain the styles and quality expected. In the past, the traders exporting basket ware had confined their activities to a few standard lines, exported largely to chain stores. These articles were bought in at very low prices, and were exported at what was admittedly also a relatively small margin. They had all been despatched by post, with the minimum of packaging.

Against the advice of all the "old hands," an exactly opposite policy was followed. The Association encouraged women to use their innate creative and artistic sense to make a diversity of lines, paid them a price in conformity with their skill and labour, but rejected all articles of inferior workmanship. The articles were carefully crated and sent in assortments of up to a dozen different lines. The purchasing firms undertook to feature the goods as a special "display of Niuean woven ware."

Consignment Ready In Three Weeks

Three weeks after the first meeting of the Niue Weavers' Association, the



Above: A few examples of the great variety of baskets and fine-quality mats made by the women weavers of Niue. Above right: The pandanus palm, which grows profusely on Niue, provides a plentiful supply of material for weaving into mats and baskets. It is known locally as "fa."

first consignment was crated. In spite of all efforts, only about £150 worth could be completed, largely because of damage to pandanus plants by the hurricane. But the hardy plants quickly recovered, and deft hands that for months or years had not been using their weaving skills were again at work.

Two months after the birth of the Association, the then very puny infant nearly expired—the organisation was entirely without capital. The Niue Administration found itself unable to help, the Niuean women had no monetary resources at all, and although several European well-wishers had offered to advance capital, interest-free, the women's committee were afraid to accept this help, and in any case wished to try to stand entirely on their own feet.

The original idea had been that they would receive credit slips for the baskets sold, and the writer had calculated that the arrangement he had made with New Zealand firms to remit by money order telegram immediately after sighting the goods would allow payment for one lot of baskets to be made just when the next shipment was being brought in. Unfortunately, shipping hold-ups and other factors resulted in the first consignment of basket ware not being received until well after the second was on its way.

In the meantime, loan money, interest-free, had had to be accepted from four or five European and Niuean friends of the Association, but the situation was still precarious in the extreme. There were several hundred pounds worth of goods on the water, or presumably in New Zealand, but not a penny had been received or even a word heard. The goods—or the prices—might have proved quite unacceptable, and the Association would have been bankrupt, with absolutely no assets whatever. However, just when things looked blackest, the long silence was explained, the remittance arrived, and together with the money came words of praise and a large increase in orders!

The speed with which the consignments were sold out created interest among other firms and just twelve months after its first shipment, the Niue Weavers' Association had on its list of customers firms not only in all the cities of New Zealand and several provincial centres, but also firms in Australia, Hawaii and even Rarotonga.

When the leaves are being prepared, the thorny edges are first of all removed with a knife.

Parallel marks are then made with the point of a pin or sharp thorn. These later serve as a guide when the leaf is being cut into strips.

In its first year the Association earned £4010 from overseas sales, and £115 from local sales. Of the total sum of £4125, the weavers received £3572. Expenses were £162 in wages for the buyer and packers, and £67 for truck hire, packing materials, postages, etc., leaving a credit balance of £324, which has been earmarked as a reserve fund and working capital.

An "All-Women" Venture

The women of the island run the organisation themselves and have shown

Before drying, each leaf must be rolled in a special way. This is done so that the "fa" will lie flat after it is dried.

great acumen, especially at the outset when they had to do weeks of spare-time work, with payment deferred for two months or more and—at one stage—apparently doubtful. Yet they were determined to "give it a go," and they are equally determined now to make their venture a permanent success. Apart from the writer—who acts as an honorary adviser on matters pertaining to liaison with New Zealand firms, and writes business letters and publicity—and the paid packer, the Niue Weavers' Association is an "all-women venture."

Although the Association has overcome most of its teething problems and can look confidently to the future, there are still many difficulties to be faced and dangers to be avoided. There are the ever-present possibilities of changing tastes and fashions in New Zealand, and of a given market becoming "glutted." The Association also has to watch constantly to see that the quality of its goods is maintained, but that prices are not allowed to spiral upwards and thus kill the goose that is laying the golden eggs!

The book-keeping involved in the system is very extensive, and internal accounts are so involved that a close audit is essential. This is one of the greatest problems, and has so far been solved only by the kind and painstaking care given successively by two competent European well-wishers who have spent dozens — almost hundreds — of hours on checking and advising.

Association May Become A Co-operative

It is felt that real continuity and permanence of the venture can be assured only if the Association can be turned into a registered co-operative. The Association hopes that when this is done, it can be given active and official support by the Administration, even if only in the form of assistance with the accounting and auditing. So far the Association has had to stand entirely on its own feet.

At the first annual general meeting held on March 10, the Resident Commissioner, Mr. D. W. R. Heatley, who was present by invitation, congratulated the Association on the remarkable suc-

Left: The rolls are pulled out into a tube so that they will dry quickly.

Below left: After drying for a day or so in the sun, the green skin covering the leaf is scraped off, leaving the strong inner fibre.

Right: Some of the material is coloured either with natural dyes, which give a dull black or brown, or (in recent years) with artificial dyes to give bright contrasting colours.

Below right: When ready for weaving, the "fa" is cut into strips by running a knife blade along the previously-marked lines.

Left: Nimble fingers quickly weave the "fa" into a traditional pattern.

Right: Round baskets are made by wrapping the strips round a core of fibre from a coconut leaf.

Below: Finishing off a basket. One like this can be made by a skilled worker in less than a day.

cess of its first year's operations. He went on to explain the advantages of turning the Association into a registered co-operative.

The members are now talking the matter over in their villages, and a vote will be taken at a future meeting. If the Association *does* decide to transform their informal and almost makeshift organisation into something more solid, Niue will see the formation of its first registered co-operative; and the kind gesture of a Christchurch store in response to an appeal by a schoolteacher on furlough may have led to a significant and lasting development in the economic life of Niue.

As far as the industry itself is concerned, so long as the skills are maintained it should be a permanent asset to the island. The "fa," or pandanus (screw-pine), flourishes on Niue, and so far has not been attacked by any of the blights or viruses which are said to have destroyed it on other islands.

The method of manufacture is depicted in the accompanying illustrations. The leaves of selected plants are tied in bundles while still growing, so that they grow straight and do not have their ribs broken by winds.

After being cut, the leaves have their barbed edges cut off with a sharp knife. They are then rolled deftly and spread in the sun for a few days to dry, then scraped with the back edge of a knife to remove the vegetable matter covering the fibres. The leaves are then slit down in strips of the required width and either woven or plaited into the mats, baskets, hats or other articles. As stiffener for woven baskets, the dried ribs of coconut leaves are used.

Decorative woven or plaited designs are formed either by dyed pandanus or by the dyed fibres of the yellow hibiscus. There is a fairly full range of natural dyes, but nowadays the brighter colours are usually bought dyes. Blacks and browns, however, are still obtained by steeping certain leaves, together with coconut husks, in boiling water.

SPC-FAO Fisheries Training Centre In Solomons

FROM August 23, twenty-five Pacific islanders from the British Solomon Islands, Netherlands New Guinea, Papua and New Guinea and the New Hebrides will attend a nine-week course in commercial fishing techniques at Tulagi, in the Solomons. It will be conducted jointly by the South Pacific Commission and the Food and Agriculture Organization.

The Fisheries Training Centre will be conducted along different lines from the SPC-FAO fisheries training course held in Nouméa in 1956. The emphasis will be strongly on the practical aspects of fishing, and for each hour that trainees listen to lectures, they will spend days at sea or on reefs learning by actual practice under the guidance of four instructors, how to make, use and maintain a wide variety of fishing gear. They will also study techniques for preserving fish by salting, drying and smoking.

Three fishing boats have been specially built and equipped for the Fisheries Training Centre by the twenty-four island trainees attending the SPC-FAO boatbuilding course now in progress at Auki, in the Solomons. These boats are 25-foot cutters, each equipped with a live well, 12 h.p. air-cooled diesel engine, and auxiliary sail.* Handling and maintenance of the boats and elementary navigation, will be part of the instruction given at the Centre.

* These boats were built to a design developed for the Commission by an Australian naval architect, Mr. Arthur Swinfield, working in collaboration with Mr. H. van Pel, SPC fisheries officer. Brief details of the design appeared in the *SPC Quarterly Bulletin* for October, 1959, while sets of plans are available from the Commission, price £stg.4/4/- per set

Grant For South Pacific Games

At the South Pacific Games meeting held at Commission headquarters last March by representatives of nine territories to consider the holding of regional sports gatherings in the Pacific, the hope was expressed that the first South Pacific Games could be held in Suva in 1963.

The Fiji Government welcomed the suggestion, and has now approved grants totalling £15,600 to provide adequate facilities. The sum includes £8,000 for a new grandstand, under which showers and changing rooms will be provided; £5,900 for constructing an area which will be used for basketball, boxing and tennis; £1,000 for drainage; £500 for terraced seating in the open; and £200 for improving spectator admission facilities

Above: One of the two twenty-acre sites for experimental gardens being cleared. Right: General view of part of one field. In the foreground is Leucaena glauca, Benth., being grown for shade for cacao and coffee. Behind it, successively, are sweet potatoes, rice, green gram, groundnuts, soybeans and maize.

Agricultural Research In Netherlands New Guinea

Within a few years the agricultural station at Manokwari, in Netherlands New Guinea, will be the main research centre in the territory. It will comprise four divisions—agricultural, soil science, forestry and animal husbandry. This article outlines the research programme of the Agricultural Division, which was recently transferred to Manokwari.

By J. RUINARD*

WITHIN a few years the Institute for Agricultural Research in Netherlands New Guinea will have at its disposal an up-to-date research station at Manokwari. Two of the four Divisions —Forestry and Animal Husbandry—will not begin operations until the buildings are ready. A third—the Soil Science Division—is still at Hollandia. The Agricultural Division was also located elsewhere—at Kota Nica, near Hollandia —until mid-1959, when it was transferred to Manokwari. This article deals with the research programme of the Agricultural Division and its new, still temporary establishment at Manokwari.

When it was agreed that the new research station would be located at Manokwari, where large experimental gardens could be established, there was no further point in extending the work of the Agricultural Division at its inferior location at Kota Nica, near Hollandia. Nor was there any point in beginning experiments with perennial crops in that garden. On the contrary, the early transfer of the Division to Manokwari and the laying out of new gardens there was of major importance.

Personnel and material were moved in August, 1959.

The sites of the two experimental gardens to be established first were still covered by dense forest, so that clearing them was the initial task. Each field is of around twenty acres. The soil of one is loamy and very deep, and it was therefore chosen for urgent experiments with cacao. It was cleared with a bulldozer.

The other field, however, is on a limestone plateau, with a soil depth varying from 4″ to 20″. Clearing had to be done by hand, because bulldozing would have destroyed the thin soil layer. In this field—which is mainly intended for collections and field trials with annual food crops—some small buildings were erected to house the Agricultural Division until the new research station is ready.

The buildings comprise three prefabricated village houses, each with a floor area of 400 square feet, which serve for offices and library, a barrack for labourers, a laboratory building consisting of a drying room for seed storage, a laboratory room, and a room with walls of mosquito netting for rearing insects under controlled conditions. A hothouse covered with a fibred plastic was also constructed.

Labour An Initial Problem

Obtaining sufficient labour was the main problem at the start. The natives inhabiting the country around Manokwari belong to one of the most primitive and least progressive tribes in Netherlands New Guinea. Initially they were prepared to clear the fields

* Dr. Ruinard is Chief of the Agricultural Division at Manokwari.

only on a piecework basis; they did not like regular labour.

Fortunately the situation is now improving. The people are finding that the stability a regular wage gives is more attractive than the vicissitudes of a nomadic life. A number have already settled near our station and in consequence we have not had to import as many workers from other parts of the country as was feared in the beginning.

The activities of the Agricultural Division are limited by several factors. There are quite a number of senior staff vacancies which cannot be filled because of lack of housing and laboratory facilities. Nevertheless, we have begun studying a number of problems of great importance for the improvement of the subsistence and cash crop agriculture of the territory.

One of the prefabricated village houses which serve as offices. On the right is a nursery of nutmeg seedlings; in the background, the water tanks.

Special Attention Paid To Cacao

As far as cash crops are concerned we pay special attention to cacao, which is likely to be the most important export crop in the near future. In the past few years about two thousand acres of cleared land in various parts of the country have been planted with cacao by native farmers, and it may be expected that in the near future, cacao plantings will be extended at an accelerated rate.

The success of cacao plantations depends in the first place on an ample supply of planting material of superior quality. As it is impossible under present conditions to plant vast areas with cuttings or bud grafts of high yielding clones, we pay most attention to legitimate seedling families.

We are now testing ten progenies in two latin squares of five families each, obtained by artificial pollination of flowers on cuttings of Keravat and Keravat-Asalingi selections, introduced from Keravat Research Station, New Britain, in 1955 and planted at the Kota Nica research station near Hollandia. Of most of these families being tested, one parent is self-compatible and the other self-incompatible. This will enable us to reproduce the seed of the best families on a large scale in isolated biclonal seed gardens

Beside testing these legitimate cacao families we are looking for high-producing mother trees in seedling plantations under our supervision. One of them — a seedling family obtained from the Agricultural University of Wageningen, Holland (and therefore called Wageningen-seedlings)—is doing remarkably well. Planted in 1955 at $16\frac{1}{2}' \times 16\frac{1}{2}'$ spacing, they yielded an average of 21 lbs. dry cocoa per tree in the five years after planting. In the past

Below: Bud grafts of cacao. Right: Legitimate Keravat cacao seedlings, nine months after planting

Newly - planted cacao seedlings under shade of Leucaena glauca Benth. (left) and Crotalaria anagyroides H.B.K. (right), both six months old.

two years the yield was about 1300 lbs. dry cocoa per acre per year. The grandparents of these seedlings—the clones Djati Roenggo 1, Djati Roenggo 38 and Getas 8—were very good producers in Java. Artificial selfings and crossings of the top producers of this family will be tested against the vegetative multiplied progeny of their parents.

Plantings for field trials to study the influence of shade and spacing on the yield of cocoa will be carried out this year. In other trials, the influence of pruning will be studied.

As far as facilities permit we try to improve the fermentation and drying of the cocoa. The main problem in this field, however, is the storage of the dried cocoa so that it is protected against moulds and insects before and during shipping to Europe. Preliminary experiments using polythene bags have given good results.

Coconut And Nutmeg

Other perennial crops are not neglected. Coconuts and nutmeg are already of considerable importance in Netherlands New Guinea, and preparatory work is being carried out for investigations into the vegetative propagation of nutmeg. In the near future, planting-distance trials with rubber, and variety trials with coffee, will be instituted in various parts of the country.

We maintain a large collection of clones and varieties of economically-important annual food crops as sweet potatoes, taros, yams, cassava, sugarcane, groundnuts, soybeans, maize, sorghum and others.

Sweet Potato Research Centre

Breeding work is done on sweet potatoes, which are almost the only source of food in the highlands of Central New Guinea. The dense population in this area is suffering from serious protein deficiency. Analyses of ten of the commonly-cultivated clones of the Wissel Lakes district showed protein content of only 0.6-1.4% on a fresh weight basis. But eleven clones of our lowland collection contained about twice as much protein, viz. 1.5-2.5% on a fresh weight basis. Therefore we think it will be possible to improve the protein content of the sweet potato by introducing new varieties in the highlands, and by breeding.

We are building a sweet potato research centre near Waghete, Wissel Lakes, and are working on this problem in co-operation with the Royal Tropical Institute, Amsterdam, the Central Institute for Food Research, Utrecht, and the Department of Tropical Agriculture of the Agricultural University, Wageningen. Introduction of better sweet potatoes into the diet of the highland Papuans will be of the greatest importance in improving their health.

Other Investigations

Research on food crops of great importance in other parts of the tropics such as maize, sorghum, peanuts and soybeans is less urgent, because in most parts of the country the people are not growing these crops yet. Nevertheless they are not being neglected.

A problem arising in all tropical countries with rapidly-increasing populations is whether the common system of shifting cultivation can be replaced by a system of permanent land use with crop rotation, and with or without mixed farming. Investigations on this point have been started last year and will be intensified as soon as the building of the main research station at Manokwari is completed.

Conclusion

This fragmentary survey of the Agricultural Division's research programme cannot be concluded without mention of the phytopathological and entomological studies, which are concentrated on the most important crops. So far disastrous damage has seldom been reported, but serious pests and diseases are present, as for example *Helopeltis antonii* Sign. and *Phytophthora palmivora* Butl. on cacao, *Oryctes rhinoceros L.* on coconuts. and a virus disease on sweet potatoes, all of which call for the utmost watchfulness.

SPC Economist Continues Capital Formation Study Of Pacific

Continuing his survey of capital formation in the South Pacific, Mr. V. D. Stace, SPC economist, is now visiting Guam and five of the six districts of the United States Trust Territory of the Pacific Islands, spending about a week in each.

His survey, which he expects to complete by mid-July, will include a study of the operations of trading companies, co-operatives, credit unions, agricultural extension services, banking and savings facilities, and special credit arrangements for Micronesians.

Second SPC Health Education Officer Takes Up Post

Since Miss Leonie Martin was appointed SPC health education officer in May 1959, work in her field, and requests from territories for her services to run courses in health education, have increased so much that at its annual meeting last October the Commission approved the appointment of a second officer. On June 18, Miss Liliane Geisseler arrived at Nouméa from the United States to take up the post.

Miss Geisseler, a United States citizen of Swiss extraction, has worked in Geneva with the League of Red Cross Societies and the World Young Women's Christian Association and in the United States with the Asia Foundation. She completed her health education training at the University of California School of Public Health in Berkeley.

On June 28 both health education officers left headquarters to carry out working assignments in Western Samoa, French Polynesia, and American Samoa.

Fijian student-farmer Matea Tokalolo surveys some of the work of clearing and planting that will have to be done around his new home in the bush, which he will share with fellow-trainee Epeli Naiseku.

Student-Farmer Scheme Launched In Fiji

By E. J. F. HACKETT*

At the Navuso Agricultural School near Suva, twelve young Fijian trainees are taking a special three-year course during which they live and work as farmers.

BOYS in Fiji are learning to become farmers in the most practical way—not only by studying, but also by living and working as farmers. On April 17 twelve students began living as farmers at the Navuso Agricultural School, about fourteen miles from Suva. The course they are taking will last three years.

The scheme is in accordance with a recommendation of the Burns Commission which stated: "Student farmer schemes should be inaugurated as soon as possible at each agricultural school. The scheme should provide facilities for students who have completed the normal course, to remain at their school for a further two years. Either individually or in small groups, they should run small typical farm units under supervision."

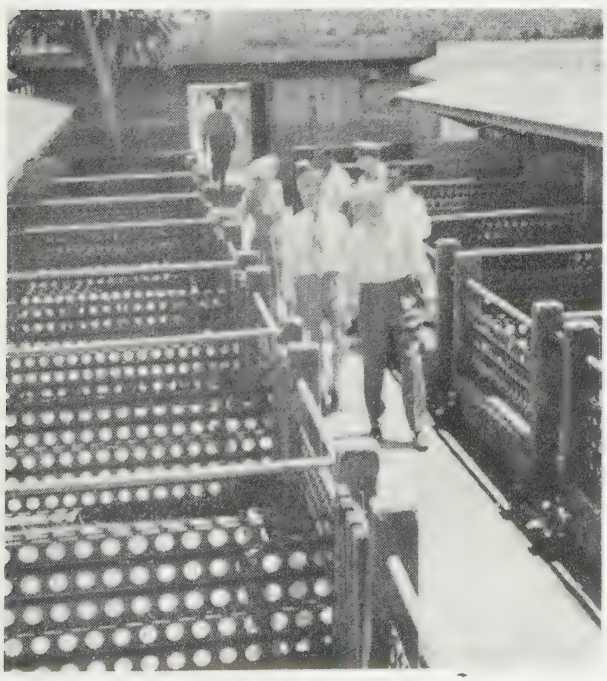
Ingenuity has been shown in starting the scheme, and excellent co-operation by those who have helped to launch it. Clearing and levelling the site for the houses for the young farmers-to-be was the joint work of students from Navuso and boys from the Ratu Kadavulevu School — a school which trains boys in the building trade.

Once the site had been cleared the Ratu Kadavulevu School boys went into action and, as part of their school trades course, skilfully erected small

(continued on page 68)

* Public Relations Officer, Fiji.

Below: On a recent official visit to the Navuso Agricultural School, the Governor of Fiji, Sir Kenneth Maddocks, and his party inspect the piggeries. Below right: Coconut nursery at the School, from which the student-farmers will obtain seedlings for their eight-acre farms.



This block of six classrooms, each 30′ x 24′, and equipped to accommodate thirty pupils, was the first of six to be completed for the new Port Moresby High School.

New Secondary School For Port Moresby

*In 1958 the Administration of Papua and New Guinea decided to build three multi-racial secondary schools—two immediately at Port Moresby and Rabaul—and a third later at Lae. The article below gives brief details of the design and construction of the Port Moresby school.**

FOR the Port Moresby secondary school, an elevated eighteen-acre site was selected, approximately five miles from the town and situated on the eastern boundary of its main housing suburb, Boroko.

The site has a south-west aspect and rises from front to rear at an incline of 1 in 30. Services such as water, sewerage and electricity are close at hand, and an Administration bus service runs along Boroko Drive, in front of the site.

The main axis of the school buildings runs east-west, to permit the prevailing breezes from north-west or south-east to enter the classrooms. Wide eaves are provided to the north elevation to prevent the direct rays of the sun from entering the classrooms at any time of the year.

An excellent view from all classrooms towards the main housing settlement was made possible by locating the school buildings 400′ back from Boroko Drive. Access to the school area is by a driveway off a side street adjoining the north-west boundary.

An oval suitable for cricket and football, and a hockey field, will be developed between the school buildings and Boroko Drive.

* Extracted from the *Report On The Development And Design Of The Secondary School, Port Moresby,* prepared by Mr. F. W. Holtom, an architect with the Public Works Department, Port Moresby.

Bricks for the School stored at Bomana. Five hand-operated machines were used to make the 65,000 bricks needed to complete Stage 1 of the construction.

General Design

The design comprises six self-contained units, or blocks, connected by covered walkways. Four blocks are arranged to form a quadrangle which will be developed later as a general open-air study and assembly area. The school will accommodate 300 students.

The main school blocks, and the order in which they are being built over a four-year period, are:

(i) CLASSROOM UNIT containing six classrooms, toilets for pupils and staff, and storeroom.

(ii) SCIENCE UNIT containing chemistry and physics rooms, domestic science, needlework, business and typing rooms, and toilets for pupils.

(iii) ADMINISTRATION UNIT providing for headmaster, teaching staff, and library.

(iv) MANUAL ARTS UNIT containing metalwork and woodwork rooms.

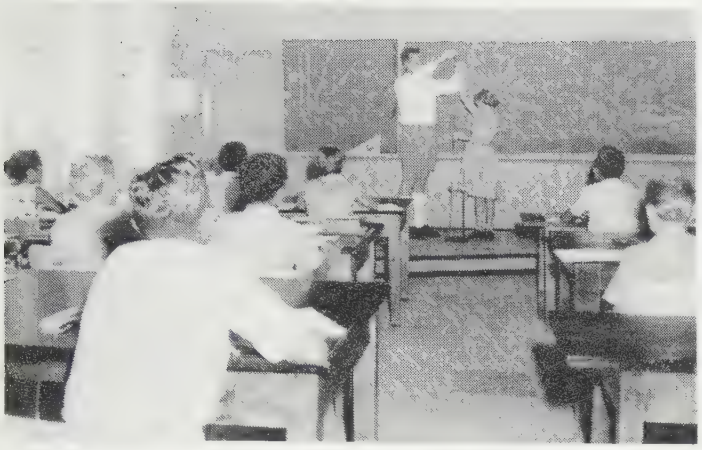
(v) CLASSROOM UNIT containing four classrooms, toilets for pupils and staff, and storeroom.

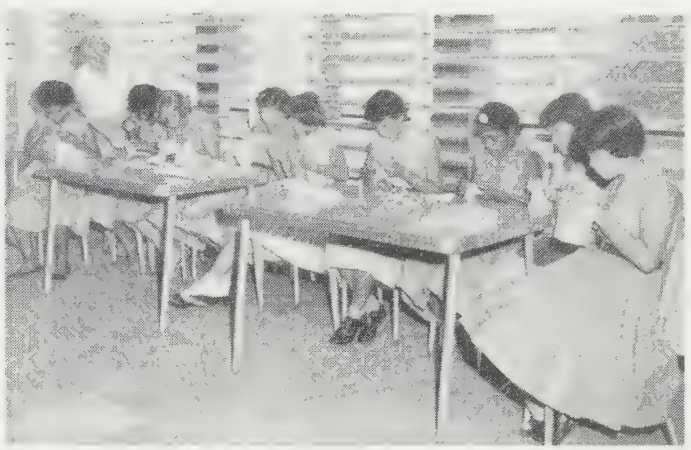
(vi) PHYSICAL EDUCATION UNIT containing assembly hall and gymnasium, showers, toilets, and small kitchen.

As the main axis of each building cuts slightly across the general contour it has been possible to build under each unit various rooms such as storeroom and undercrofts and—in the case of the Science Unit—the chemical and physical laboratories.

Details Of Units

CLASSROOM UNITS (2): It is essential that all classrooms have the maximum of natural light, without undue glare, and the benefit of prevailing winds.





Above: A science class in progress at Port Moresby High School. Right: A sewing class. The new classrooms are cool and airy, with a maximum of natural light.

Both have been ensured by the siting method adopted, with verandahs and covered walkways on the southern edge of each building.

Each classroom of 30′ x 24′ (720 sq. ft.) is fully equipped to accommodate up to 30 pupils. All floors are of reinforced concrete covered with marble grey vinyl tiles. Ceilings are of acoustic tiles.

Each room is fitted with electric fans and continuous fluorescent lighting, all fully controlled to give varying degrees of light and circulating air. A full-width chalk board is fixed to the front wall, and a pin-up board with cupboards under is fixed to the rear wall. Full-height windows are provided on both sides of the room, those on the north side being casement type, while on the south side, adjustable baked-enamel metal louvres are provided.

A store 12′ x 5′ off each classroom gives ample storage facilities for each teacher.

Covered walkways link all classrooms, giving access to playing areas and main entry. These walkways will join with those provided for future buildings to form the connecting link between each building unit.

SCIENCE UNITS (2): Chemistry and physics, domestic science, business and typing, and manual arts rooms are to be equipped for their special functions. The physics room will have a fully-equipped photographic dark room. All science rooms will be served with bottled gas for bunsen burners, gas stoves, etc.

ADMINISTRATION UNIT: This will comprise headmaster's and teachers' facilities including general office, headmaster's office, teachers' common room, first aid room, and teachers' study rooms. In addition, a library and reading room will be provided for use by both pupils and teaching staff.

ASSEMBLY HALL AND GYMNASIUM: This building, which will adjoin the Administration Unit, has been designed for various uses — indoor games, plays, dancing and community functions being but a few. A small kitchen, toilet, and shower facilities will be provided at the rear.

General Construction

The decision to use bricks of standard 9″ x 4½″ x 3″ size permitted conventional construction methods normally associated with burnt-clay bricks in countries of older culture.

In the absence of any commercial concrete pre-casting yard to provide portal frame units, the clay foundations

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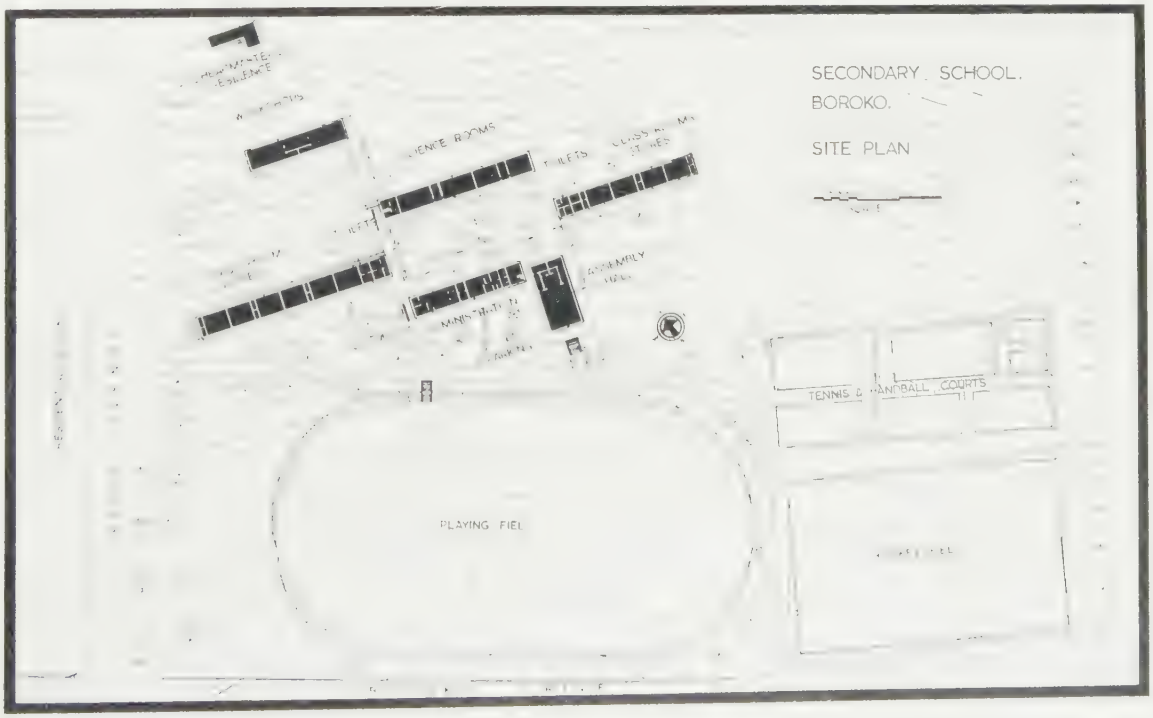


Site plan of the new Port Moresby High School at Boroko. The main axis of the buildings runs east-west, to obtain maximum benefit from the prevailing breezes.

Youth Study Group Meets At Port Moresby

Eighteen young Pacific islanders from eight territories attended a Study Group held in Port Moresby from June 5-14 to discuss the problems of youth in Pacific urban communities.

By RICHARD SEDDON*

Study Group participants with Administration and SPC staff who took part.

AT its 1960 session the South Pacific Commission offered to assist territories ready to convene sub-regional study groups during 1961 on the topic "Problems of Youth in Urban Communities". In response to this offer the Administration of Papua and New Guinea requested Commission assistance in the convening of such a study group.

In addition to the host territory, seven territories lying in the western part of the South Pacific were invited to participate in the study group, and all promptly accepted the invitation. Most of these territories assisted in the preparation of their participants by convening study groups to enquire fully into the local situations, and in some instances participants were selected on the basis of their contributions to the work of the local study groups. To assist in this preparation the Commission made available a basic working paper and a select list of suitable reference materials.

The Study Group was formally opened in Port Moresby on Monday, June 5, by His Honour the Administrator of Papua and New Guinea, and for the first week its programme was devoted to opening discussions, to a series of field visits in both Port Moresby and in Lae, and to opportunities for informal discussions with leaders of a wide range of community activities.

In the opening discussions the participants were invited to outline the general urban situation in their respective territories as a background against which the problems of youth would be considered. Field visits were made to such places as the Kaugere and Hohola Housing Settlements, Kaugere Welfare Centre, and villages on the periphery of Port Moresby, while in Lae, visits were made to one of the Local Government Councils, Technical Training Centre and a Mission School. In both centres informal discussions were held with District and Welfare Officers, and with leaders of community groups such as Boy Scouts and Girl Guides, Welfare Societies, Sport and other Clubs, and a variety of Associations.

Other occasions of particular interest were a Rotary Club luncheon in Port Moresby, which included a panel discussion with speakers both from the Club and the Study Group, an evening with the multi-racial Contact Club in Port Moresby and another with the mixed-race Huon Association in Lae, attendance at an evening session of the Legislative Council when a Child Welfare Bill was being debated, an International Night arranged by the Girl Guides' Association in Port Moresby, and an evening of entertainment at Stewart Hall in Lae, in addition to many other most enjoyable social functions.

The Group's final discussions were centred round an analysis of the underlying conditions giving rise to feelings of insecurity and dissatisfaction among the youth of the urban centres, with particular reference to ways and means by which the community itself can be assisted both to appreciate the nature of many of the difficulties which youth encounter and to seek to develop opportunities for youth which can help them to make a more satisfactory adjustment to many of their difficulties.

It was pointed out that in the South Pacific's urban centres, young people were being confronted not only with the usual problems of adolescence but with many additional problems resulting from a change to a new way of life. Among the more important conditions that came under detailed discussion were the status and welfare of the family with particular reference to the migrants, difficulties caused by inadequate housing, questions relating to health, and problems arising from the drift of young people to the towns in search of better education, vocational opportunities or distraction. The extent and nature of present educational opportunities, the situation of young people who have received little or no education and the widespread need for further educational opportunities for those already in employment if their job opportunities are to improve were topics that gave rise to a great deal of informative discussion centred on present or planned developments in the territories. Educational and other measures that might be taken to counteract this urban drift were also considered.

The need of youth for satisfactory and satisfying recreational outlets was also stressed, both in relation to organized sport and to less formal ways in which a wide range of recreational interests could be catered for. Discussion emphasized the feeling of the Group that the community itself should be encouraged to take the initiative in much of this, seeking government support only where essential and most appropriate.

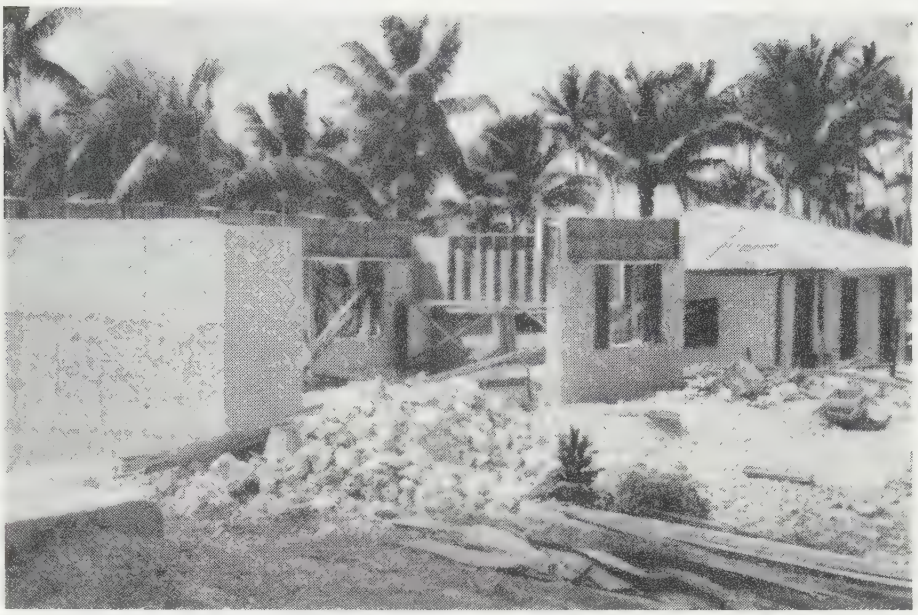
The important contributions of voluntary organizations, religious and other bodies were carefully reviewed, especially in relation to the important matter of training for leadership, while many

(continued on page 72)

* Dr. Seddon, who is Executive Officer for Social Development, South Pacific Commission, directed the Study Group.

New Homes For Homeless Niueans

Nine hundred houses were destroyed or badly damaged by the two hurricanes which devastated Niue Island early in 1959 and 1960. With outside financial and technical aid, Niue islanders are making very good progress in replacing them with houses of simple design that can be built quickly and cheaply.



A partly-completed house with poured concrete walls. The pile of local rock in the foreground will be crushed to make lime for concrete.

EXCELLENT progress is being made in re-housing families on Niue made homeless by the disastrous hurricanes of 1959 and 1960, and if the present rate of building continues, the programme should be completed in 1963, a year ahead of schedule. While the people of Niue have received assistance from the New Zealand Government and overseas relief funds, they are doing much to help themselves.

At the end of January last, 169 new houses had been occupied, and between 800 and 900 of the more unfortunate people housed. Another 479 houses had been pegged out, foundations laid for 253, and the walls of 183 finished up to roof level.

Two Devastating Hurricanes

When the hurricane of February, 1959, destroyed or seriously damaged 750 houses on Niue, the New Zealand Government agreed to advance money to the Island Assembly to buy material for 450 houses. Apart from cement for foundations and corrugated asbestos roofing, local materials were to be used to reduce cost. Each householder was to repay £175 (the cost of materials) for his dwelling in ten years.

Relief funds from overseas were to be used to build 150 prefabricated units to be occupied rent-free by old people, and to reduce the cost of other houses by allowing a discount on materials.

Before this scheme was properly started, the hurricane of January, 1960, made conditions even more serious. Some people were reduced to living in "humpies" of corrugated iron salvaged from damaged houses; the number of dwellings to be replaced rose to 900; and the island's sawmill, a vital adjunct to the re-housing programme, was made almost unserviceable.

The New Zealand Government and Niue Island Assembly agreed to continue the existing scheme with modifications to meet changed circumstances and accelerate relief of homeless families.

Four-Year Plan To Build 800 Homes

A four-year plan requiring the construction of 200 houses each financial year until 1963-64 is now well under way. To hasten construction, New Zealand framing timber and cement wallboard is being used. The use of imported material will be progressively reduced until in 1963-64, 150 houses will be built with local materials except for foundations and roofs.

The money lent by the New Zealand Government pays for the material to build the shell of a two-bedroom house of 612 square feet, which can be extended by adding bedrooms. The occupants provide doors, windows and other extras. The shell of a detached ablution and kitchen unit and a 400-gallon water supply tank are also provided out of loan money.

The cost of houses varies between £175 and £250 according to the materials used. If the occupant repays £175 with-

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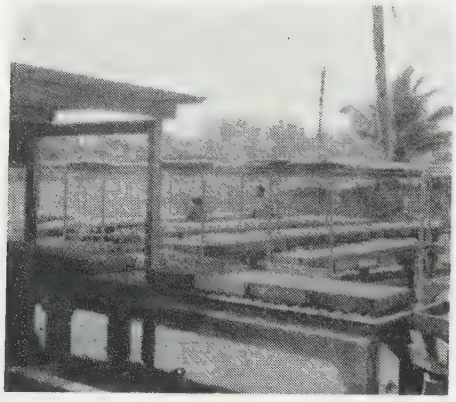
Group of houses—typical of those being built under the current re-housing programme—near Alofi, the administration centre on Niue.



Above: A part of the nursery at the Guam Agricultural Station. In the background are vegetable seedlings ready for distribution; in the foreground are seedboxes filled with a disinfected mixture of river sand, humus and light soil. Centre: Loading vegetable seedlings for distribution to growers. Right: The vegetable and fruit market at nearby Agana. It is supervised by the Department of Agriculture.

Agricultural Development In Micronesia

To further the Commission's work in plant introduction, the author recently visited agricultural stations in Guam and the United States Trust Territory of the Pacific Islands. In the article below he briefly reviews their activities.

By JAN COENEN*

IN Guam, the emphasis in agriculture is on the production of vegetables and fresh fruit, in order to reduce imports from the United States. There are not sufficient growers on the island to meet local needs, but their numbers are steadily increasing, as is production generally.

The Agriculture Department works closely with growers by supplying them with vegetable seeds and seedlings, farm implements, chemicals, fertilizer etc. On-the-spot advice is given by several agricultural extension agents dispersed throughout the island, while the monthly *Extension Service Newsletter* keeps contact between growers and the Department.

The agricultural station, situated near Agana, the capital, carries out experiments in the fields of animal husbandry and pasture improvement. Several promising grasses and legumes have been introduced to this station through the Commission's plant introduction service.

Ponape Agricultural Station

Each district in the United States Trust Territory of the Pacific Islands has an agricultural station as a base for agricultural operations. Its main activities include plant propagation, testing and distribution of subsistence and economic crops, crop demonstration, raising of livestock, agricultural instruction etc. The programme of each station is determined to a large extent by the desires and needs of the local people.

The agricultural station on Ponape, in the Eastern Caroline Islands, is situated near the little town of Colonia, the administrative centre of the Ponape district.

The main experimental work of the region is carried out at Ponape agricultural station. Existing subsistence and economic crops are improved by selection for resistance to diseases, higher yields, early maturity, etc. Demonstration plots are established on the station to show visiting farmers and agricultural students the results of better cultivation and fertilization practices.

For the territory's crop improvement programme, several species of economic and subsistence crops have been introduced to Ponape station through the South Pacific Commission's plant introduction service. Introduced crops now under trial there include several improved varieties of Colocasia taro, sweet potatoes, sugarcane and pineapple from Hawaii, cassava from Central America, grain sorghum varieties from the United States, black pepper varieties (ex India, ex Borneo and Belantoeng) from Naduruloulou station in Fiji, several grasses for pasture improvement, legumes for ground cover, and soil improvement.

After the testing period and further

* Plant Introduction Officer, South Pacific Commission.

Part of the black pepper collection established at the Ponape Agricultural Station with introductions from Fiji made through the SPC Plant Introduction Service.

propagation, plant material is distributed to the local farmers or sent to other district agricultural stations.

Black Pepper An Important Cash Crop

Black pepper varieties introduced from the Naduruloulou station in Fiji are growing very well at Ponape station, and more than one acre of land has been set aside for their planting and further propagation. There is promise of good production, and soon after sufficient propagation material is available, pepper might easily become the third cash crop for this part of Micronesia, following coconuts and cocoa.

Beside the pepper propagation area, nearly two acres have been planted to carry out experiments on different spacings, fertilization, temporary stakes, and use of a leguminous tree to provide live stakes.

Demonstration Areas Of Important Crops

BREADFRUIT: As breadfruit is a very important staple food in most parts of Micronesia, a demonstration area of this useful tree was established a few years ago on the Ponape station. The collection includes outstanding local varieties and more than thirty excellent varieties from the Truk district introduced in order to experiment on pruning, fertilization, yields etc.

As breadfruit trees on Ponape bear for only about six months of the year, Trukese varieties have been introduced to find out if the fruiting season can be extended. Records are kept of time of bearing for each variety. Trees spaced 50' apart will be pruned for proper formation. After the testing period, proved outstanding varieties will be introduced in large quantities into other islands of the Trust Territory.

CITRUS: Several citrus species have been introduced and are now under trial in the station's citrus orchard. After different varieties have been tested for adaptability and fruit taste, scion wood of selected varieties is taken and propagated by budding or grafting on to sour orange rootstock. Later, the budded or grafted stock will be distributed to local farmers.

COCONUT: A model coconut experimental and demonstration centre has been developed at the Metalanim plantation, which is now Government operated. Instruction and demonstration are given in coconut seed selection, planting and cultivation methods, copra processing etc. Several coconut plots are now inter-planted with cacao.

CACAO: A two-hectare cacao demonstration area on which has been built a small cacao fermenting and drying plant is located near the Ponape agricultural station. The area is used for trial seed introductions, experimental projects and for training of cocoa growers. Seven Micronesion trainees assist the Trust Territory's cacao specialist, Mr. E. Iwaniec, in promoting the cacao programme throughout the Ponape district. They supervise nursery construction, field preparations and planting of cacao by farmers.

Under a special cacao-subsidy programme, about 50,000 seedlings have been planted in 1960. Most of the farmers have accepted 500 trees as a minimum-size planting. Spacing 12' between centres is an established practice.

The seeds not used for propagation are processed for export, and last year Ponape exported 3,000 pounds of dry beans. This quantity is of course very small, but it has established a cash value for a new crop, and this will encourage those farmers who hitherto have hesitated to plant cacao.

In Ponape there is an estimated 6,000 acres of land suitable for cacao, and when planted, the income from this area could double the present income of the Ponape population.

Agricultural Extension In Ponape District

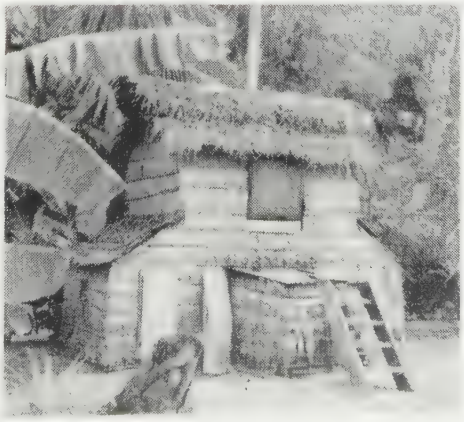
Agricultural extension plays a very important role in the Ponape district. Most of the islands in the district are visited regularly by agricultural extension agents who assist the local people with advice, new plant material, etc. They also supervise about eighty coconut nurseries with a total capacity of 90,000 seednuts. When six months old, seedlings are selected for field planting, about 40% being discarded.

Cacao project trainee Reward Tara, with cacao pods for dispatch to the Truk district. Two years ago, Mr. Tara was sent to the Cacao Institute at Turrialba, Costa Rica, for training. He now assists the cacao specialist at Ponape Agricultural Station.

Under supervision of the agricultural extension agents, many coconut areas in the Ponape district have been completely rehabilitated. Old palms have been cut down, young ones thinned out and new ones planted where needed. Also, hundreds of mother palms have been selected and marked with numbers for seednut selection.

AGRICULTURAL EDUCATION: At the

Below: This Japanese modification of a German hot-air copra drier is widely used by smallholders in the Caroline and Marshall Groups. Centre: Ceylon type copra drier recently introduced on Yap Island. Right: Marshallese type drier now under trial at Yap Agricultural Station.



Pawpaw seedlings in plastic bags in the nursery of the Agricultural Station on Majuro Atoll. At left is Mr. Lemos Lakbong, foreman of this station.

Pacific Islands Central School in Ponape, as well as at the intermediate schools all over the Trust Territory, theoretical and practical agricultural education plays an important role in the school's programme. Each school has its garden where each student cares for his own plot in which are cultivated vegetables, subsistence crops such as breadfruit, taro, bananas, sweet potatoes etc.

As the Pacific Islands Central School is situated near the agricultural station, students can observe its activities.

Stations At Majuro, Yap And Koror

MAJURO: The district agricultural station of the Marshall Group is situated on Majuro Atoll. This station propagates plant material and raises livestock such as chicken, hogs and ducks, for distribution to other atolls in the district.

Several violent typhoons had struck this district in the past, and an Island Development Department was organized in 1958 in order to carry out rehabilitation work on typhoon-devastated atolls. The Department is headed by the District Agriculturist, as the main part of the rehabilitation work is of agricultural nature. The station supplies the devastated areas with agricultural tools, plant material of subsistence crops, seednuts for replanting etc.

An experimental planting of coconuts is established on one of the islands in the Majuro Atoll, using selected seednuts from Yap Island.

YAP: While I was on Yap Island—the "coconut Eden" of the Trust Territory—I visited the agricultural station and various coconut areas. In the past few years, more than 50,000 selected seednuts have been distributed from the agricultural station to other districts.

The cacao planting programme in the Yap district is supervised by trained agricultural extension agents. The Yap subsidy quota of 10,000 cacao seedlings has been filled, and all plantings are under the station's supervision.

Copra provides the main cash income from many parts of Micronesia, and its processing is therefore important. Several improved types of copra driers are now under trial. The Ceylon-type drier had been introduced previously, and construction of this type is now continued all over the island under supervision of extension agents. A Marshallese type of copra drier was recently built at the agricultural station and is under trial. As several typhoons have struck this district also in the past few years, rehabilitation work is also an important task of the station.

KOROR: The development of agriculture in the Palau district is conducted from the agricultural station on Koror Island. Nineteen trained Micronesians assist the District Agriculturist in carrying out the agricultural programme — subsistence crop improvement, livestock improvement, cash crop promotion, soil conservation measures etc. Extension agents visit regularly all the islands in this district to supervise and advise on the planting of cacao, coconuts, mahogany and teak.

The Koror station covers roughly three acres, on which are established a nursery, demonstration and experimental plots of economic and subsistence crops, poultry houses, piggery and toolshed. There is also a cacao demonstration plot of ten-month-old hybrid cacao plants.

The cacao programme is under the supervision of Mr. Huan Rehensengel, who in 1958 spent six months studying at the Cacao Institute at Turrialba, Costa Rica.

Experiment In Rhinoceros Beetle Control

Before leaving the United States Trust Territory I paid a short visit to Ngesebus islet, in the Palau district, where a vegetative barrier experiment in the control of the rhinoceros beetle is being carried out under the supervision of Mr. B. Owen, the staff entomologist. The South Pacific Commission is financing the project. More than half of the coconut trees in the Palau district have been killed by the rhinoceros beetle.

Three experimental plots — each of around fifteen acres—have been set up side by side on the islet. The two end plots have been cleared of all vegetation over two feet high and on one, a leguminous tree will be planted between the coconut rows. The centre plot is being kept in the same condition as the rest of the coconut plantation on the island. Within an eight-foot radius of each coconut palm, vegetation is kept down. Outside this circle it is allowed

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Below: Nursery of the Koror Agricultural Station—cacao seedlings in foreground. Right: Cacao trainee Huan Rehensengel inspecting cacao seedlings. In 1958 Mr. Rehensengel spent some months studying at the Cacao Institute at Turrialba, Costa Rica.

Copra Production In The South Pacific

This article reviews major trends in copra production in the South Pacific during the past quarter century. After stressing the continuing importance to the Pacific of the copra industry it indicates factors that are restricting plantings, and concludes by briefly describing the efforts of territorial agricultural services and other agencies to improve standards of coconut cultivation in the region.

By V. D. STACE*

Copra being sun-dried on a Taveuni estate, Fiji.

IN May, 1952, the South Pacific Commission engaged Mr. W. V. D. Pieris, formerly Acting Director of the Ceylon Coconut Research Institute, to carry out a regional survey of coconut cultivation and copra production in the South Pacific territories.

Technical publications prepared by Mr. Pieris, and advice given by him in the field during the course of this survey, have played an important part in raising standards of efficiency in the preparation and marketing of copra throughout the area, especially in those territories where an increasing proportion of local copra production comes from native smallholdings and village plantations.

Based on his observations in the territories, Mr. Pieris prepared a paper for presentation at the Eighth Pacific Science Congress held in Manila in November, 1953[1]. It stressed the urgent need for general rehabilitation of coconut cultivation throughout the South Pacific by the systematic regeneration of commercial plantations and the widespread thinning-out and restoration of native groves. In this paper Mr. Pieris stated with forceful simplicity his considered views of the state of coconut cultivation generally in the territories he had visited. A key quotation reads:

"The general picture presented in all these territories is the same; coconut groves and plantations well past their prime, growing old and slowly going out of production, or due to various degrees of neglect, not producing as they ought. Thus it is not unusual to encounter, on the one hand, palms well over 70 years of age producing an estimated average of 10 to 15 nuts per palm per annum, and on the other, 30 to 40-year old palms producing 20 to 30 nuts per palm per annum. When it is remembered that a 30 to 40-year old palm, with moderate attention, is capable of producing an average of 60 nuts per annum, the unsatisfactory situation can be fully realized."

Some of the territories visited by Mr. Pieris in 1952-53 were still in the process of reviving plantation and other economic activities that had been seriously disturbed by the Pacific War. This type of rehabilitation is now largely completed, although abandoned plantations are not uncommon in some areas.

Although no regional survey of the coconut industry has been made since the Commission's 1952-53 project, there is now some evidence of willingness on the part of commercial coconut estates in the South Pacific to replant and extend plantations; but this form of development is still exceptional in most territories. The rather limited extension of coconut areas that has occurred in the region during recent years is predominantly on native smallholdings, where cultivation standards in general continue the unprogressive tendencies described in the Pieris survey.

Export And Production Trends

A period of quite rapid development in the South Pacific coconut industry was finally brought to a close when disastrously low market prices for copra in the 1931-34 "depression" years inflicted widespread financial hardship on plantation owners and seriously undermined confidence in the industry's future.

Before this reverse, copra exports from most South Pacific territories had increased steadily as commercial plantations developed and capital from private sources was still available for expansion. For the years 1920-24, the average annual exports of copra totalled about 125,000 tons a year, mounting substantially to an annual average of 180,000 tons in 1925-29. Thereafter, as is shown in Table I, the increase in output was more restrained, increasing by 45,000 tons annually (25%) in the next ten years.

In the early 1920's, copra shipments from the Polynesian island territories totalled about 40,000 tons annually, representing 32% of the total output from the South Pacific region. Ten years later, although exports from the Polynesian territories had increased slightly to about 43,000 tons annually, this rate of production provided but 22% of the South Pacific export trade in copra for the years 1930-34, since production had increased more rapidly in Australian New Guinea, the Solo-

1 This paper was published in the *SPC Quarterly Bulletin* for January, 1954.—Editor

* Economist, South Pacific Commission.

mon Islands, Papua and New Hebrides. Among the Polynesian territories, only French Polynesia showed any sustained increase comparable with the upward trends achieved in the Melanesian territories mentioned.

In the years immediately preceding World War II, the previously-established copra exporting trends were maintained. Exports from Melanesian territories increased to about 150,000 tons annually, of which Australian New Guinea provided some 69,000 tons. Fiji, then second in importance as a copra-producing territory in the South Pacific, provided an average annual tonnage of over 30,000 tons. Except in French Polynesia, where the volume of copra production continued to increase, a marked falling off in the tonnage and relative importance of these exports was becoming obvious in the trade statistics of the Polynesian territories.

During World War II, copra exports from most South Pacific territories fell to low levels, and in some areas ceased almost entirely. The total amount of copra exported for the region in 1943 was reduced to about 75,000 tons, representing one-third of the volume of average annual shipments in the pre-war years 1935-39.

In 1943, hostilities had practically eliminated copra exports from the Gilbert and Ellice Islands, Australian New Guinea and the Solomon Islands, while shipping problems and other difficulties such as a large-scale diversion of local labour resources to defence and other activities reduced copra production in most other territories to very low levels.

By 1947, exports from Fiji, French Polynesia, New Hebrides, Tonga and Western Samoa had moved upward to or above their pre-war levels, but recovery in other areas more directly affected by hostilities was protracted and difficult. Exports from Australian New Guinea in that year were a mere 4,400 tons — approximately 6% of the pre-war volume—while the 500 tons exported from the Solomon Islands represented about 2% of the average annual shipments moving from the Protectorate during 1935-39.

Several years passed after World War II before the total copra production of the South Pacific territories returned to the level obtaining before hostilities. In the four years 1948-51, however, Australian New Guinea, with an average annual production of 49,000 tons, was again the principal copra-producing territory in the region.

By this time the territorial copra production pattern in the South Pacific had changed in some important respects. The industry in Papua, Fiji, New Hebrides, Tonga, the Samoas and French Polynesia was maintaining output at levels quite appreciably higher than the tonnages achieved in pre-war years. Steady recovery was being achieved in the British Solomon Islands Protectorate, but a reduction in output

TABLE I: PACIFIC ISLANDS' COPRA PRODUCTION AND EXPORTS

(Thousands of Tons—Metric)

	*AVERAGE ANNUAL EXPORTS***				*ESTIMATED ANNUAL PRODUCTION**		
	1920/24	1925/29	1930/34	1935/39	1948/51	1952/55	1956/59
	(TONS) ('000)	(TONS) ('000)	(TONS) ('000)	(TONS) ('000)	(TONS) ('000)	(TONS) ('000)	(TONS) ('000)
MELANESIA							
Australian Administered New Guinea	28.0	51.7	61.4	69.3	49.4	74.4	85.6
Papua	5.1	9.6	9.8	10.7	12.1	13.4	14.7
Netherlands New Guinea	N/A	N/A	N/A	4.5	3.2	3.6	5.1
British Solomon Islands Protectorate	13.3	20.7	21.9	21.9	12.0	17.4	21.1
New Hebrides	5.4	9.9	8.6	11.2	23.4	22.8	31.3
New Caledonia	2.5	3.0	2.4	2.7	2.2	3.2	2.5
Fiji	19.9	27.8	20.4	30.6	33.6	38.3	36.7
POLYNESIA							
Tonga	12.5	14.3	10.6	11.8	18.2	19.0	18.6
Western Samoa	11.7	13.5	10.9	12.5	15.0	15.7	13.6
American Samoa	1.3	1.1	0.8	0.8	2.4	1.8	0.8
Cook Islands and Niue	2.2	2.4	1.7	1.5	2.4***	3.1***	2.4***
French Polynesia	12.5	13.9	18.5	21.6	25.9	30.5	23.8
MICRONESIA							
Gilbert and Ellice Islands	5.1	4.7	6.3	6.3	7.5	9.0	6.3
U.S. Trust Territory of the Pacific Islands and Guam	—	—	—	16.0	12.2	10.8	11.2
ESTIMATED REGIONAL TOTALS	125.0	180.0	195.0	225.0	225.0	265.0	270.0
WORLD PRODUCTION TOTALS:					2590.0	2970.0	2990.0

* Source: F.A.O. "Coconut Situation" No. 4. ** Including Estimates. *** Including Tokelau Islands.

was recorded for New Caledonia and the United States Trust Territory of the Pacific Islands.

In more recent years, total production has levelled off or declined in the Polynesian territories, Gilbert and Ellice Islands, Fiji, as well as in New Caledonia and the United States Trust Territory, and these trends emphasize the importance of the appeal for widespread rehabilitation made in 1953 by Mr. Pieris.

Of all the industries in the South Pacific, copra production has stood the test of time, but there is a great scope for its improvement and extension. In most areas the cultivation of coconuts presents fewer hazards for native cultivators than is the case with the alternative cash crops now attracting attention. Most of the latter need continuous and competent husbandry as well as the skills and finance now often required to prevent serious losses from pests and diseases.

The Continuing Importance Of Copra

Although copra production in several Pacific island territories is declining, and achievements in the industry for the region generally compare unfavourably with current developments in more progressive coconut-growing areas in Asia and elsewhere, the coconut is still the economic mainstay of the South Pacific.

In the atoll groups such as the Gilbert and Ellice Islands and the Tuamotu Islands of French Polynesia, copra, as the only available export for the people in most instances, is the prime source of local cash incomes. Commodity exports by Tonga, the British Solomon Islands Protectorate and the New Hebrides are restricted almost entirely to copra. Even in Australian New Guinea, where there is a wider range in export trade than is usual in the South Pacific—with considerable interest in alternative crops such as cocoa, groundnuts and *Robusta* coffee—copra exports nevertheless provided 59% of total export earnings during the period 1956-58. The territory's latest returns for the year ended June, 1960, show that the total value of coconut products exported for the period represented just over 60% of the value of all outward shipments of territory produce.

The comparisons in Table II show that the general tendency in South Pacific territories is for copra exports to provide a diminishing proportion of total export values in territories where population densities are high in relation to land resources. Exceptions exist in those island territories in atoll areas where physical conditions confine cash cropping to coconut production. Elsewhere, as pressure of population growth becomes more evident, claims for the more intensive forms of agriculture must be heeded if living standards are to be maintained or improved. In such territories, copra exports will tend also to be depressed by increasing demands on the nuts harvested to augment local food supplies, unless this pressure is relieved by effective action to increase productivity in the industry.

The 1959 Burns Commission of Enquiry into economic resources and population trends in Fiji drew attention to important features of the Colony's coconut industry that are known to apply generally in South Pacific territories. Copra provides the Colony's second largest export crop, but in the absence of extensive replanting and rehabilitation, the output of copra must shortly begin to decline progressively and seriously.

The information available to the Burns Commission showed that about 65 per cent of all coconut palms in Fiji were

TABLE II: PACIFIC ISLANDS' COPRA EXPORT[1] EARNINGS IN RELATION TO TOTAL ANNUAL EXPORT, 1936-38 AS COMPARED WITH 1956-58

SOURCE: Official Trade Statistics and *Pacific Islands Year Books.*

	1936-1938			1956-1958		
	Average Annual Value Of Copra Exports In Local Currencies (£'000)	Average Annual Value Of Total Exports (£'000)	Copra Exports As A Percentage Of Total Exports	Average Annual Value Of Copra Exports In Local Currencies (£'000)	Average Annual Value Of Total Exports (£'000)	Copra Exports As A Percentage Of Total Exports
MELANESIA						
Australian Administered New Guinea	947	2,981	34%	5,908	9,942	59%
Papua	239[2]	524[2]	46%	1,060	2,437	44%
British Solomon Islands Protectorate	293[2]	331[2]	88%	1,348	1,687	80%
New Hebrides	59	129	46%	1,392	1,808	77%
New Caledonia	4,000 frs.	120,000 frs.	4%	16,000 frs.	2,403,000 frs.	1%
Fiji	361	2,227	16%	2,612	13,433	19%
POLYNESIA						
Tonga	118	127	93%	1,669	1,891	88%
Western Samoa	154	288	53%	748	2,221	34%
American Samoa	$38[3]	$57[3]	66%[3]	$188	$4,725	4%
Niue	7[3]	14[3]	50%[3]	42	60	70%
Cook Islands	14	76	18%	63	477	13%
French Polynesia	26,632 frs.[4]	54,026 frs.[4,5]	49%[5]	220,000 frs.	472,000 frs.[5]	47%[5]
MICRONESIA						
Gilbert and Ellice Islands	55[6]	55[6,5]	100%[5]	517	517[5]	100%[5]

NOTES: (a) Average annual totals based on two or three consecutive years in the period stated, unless indicated otherwise by footnote.
(b) Money values expressed in local currencies, £stg., £Aust., or U.S. dollars.

FOOTNOTES: [1] Copra export values include exports of coconut oil and desiccated coconut. [2] Year ended June 1937. [3] Year ended December 1936. [4] Year ended December 1939. [5] Excluding phosphate exports. [6] Years 1934-36.

A neglected and overgrown coconut grove. Encroaching forest growth is in evidence, and also a mass of self-sown coconut seedlings in active competition with each other and the mature palms. Shortland Islands.

about 50 years old and over, some 15 per cent were probably between 40 and 50 years old, while not more than 5 per cent were under 10 years of age. Thus, more than seventy per cent of the coconut palms in Fiji are past their prime, and slowly going out of production.

The Burns Commission expressed the view that during the past thirty years not more than 12,000 acres of coconuts had been planted, giving an average planting of 400 acres per year. Against this — "it has been estimated that in order to maintain the industry at its present production, an annual planting of the order of 3,800 acres will be required." It was stated also that during the past decade, probably less than 1,000 acres of new plantings had been made on plantation estates, most of the limited extension and replanting that had occurred being in Fijian groves including an unstated proportion of "replanting" by natural regeneration.

As demonstrated in the above age analysis of palms in Fijian coconut plantations and groves, the copra industry in the South Pacific territories has been moving for some time on momentum generated in the main by active plantation development undertaken before World War I and in the inter-War years up to the early 1930's.

In the past thirty years, a feature of the copra export trade in the South Pacific has been its increasing dependence on the small-scale production of the islanders rather than the output of plantation estates. In Fiji, it is estimated that about 60% of total copra production comes from Fijian smallholdings.

Prior to World War II most of the copra exported from the Solomon Islands came from plantations owned by overseas companies, and very little from Solomon Islanders producing on their own account. Now, however, a substantial and growing proportion of annual copra production in the Protectorate comes from native smallholdings and village plantations. In the New Hebrides, possibly half of the present output is produced by Melanesian growers. In territories such as Tonga, Western Samoa, Gilbert and Ellice Islands and New Caledonia, for example, less than 20% of copra production comes from plantation estates, the bulk of the supply being provided by the islanders from groves on family or community lands.

Problems Restraining Coconut Planting

Among the factors restraining development on coconut plantations in the South Pacific, the following discouragements are of special importance. The record of rather extreme price instability on international copra markets during the inter-War years has not been erased by the more favourable prices and marketing conditions obtaining since World War II, and there is some lack of confidence in the future industry among European planters and investors.

The coconut varieties grown in the South Pacific do not provide payable crops until eight to ten years after planting and a satisfactory rate of production is not achieved for about fifteen years. This period of waiting without financial returns is discouraging to individual planters with limited capital resources[2].

In addition, maintenance costs on a newly-established plantation are especially high, since the young trees must be carefully protected by hand or mechanical clearing operations against the suffocating effect of bush, weed and scrub growth. In the early years of develop-

[2] Where soil and climatic conditions permit the interplanting of coconut plantations with cocoa, as in New Guinea, the first returns from such interplantings, which begin to come in about four years after establishment, reduce this financial burden.

Part of a rehabilitated coconut estate plantation, restored after serious neglect and damage during World War II. Russell Group, British Solomon Islands.

ment, clearing costs on newly-planted areas cannot be reduced by the employment of cattle for weed control until such time as the coconuts have reached sufficient height and strength to ensure adequate protection from browsing and other forms of animal damage.

Certainly these discouragements should be considered against the longer-term prospect of steady yielding for some fifty years after plantation establishment, but the advantages of such future benefits are often discounted in the light of apparently increasing risks from diseases and pests, of which the rhinoceros beetle (*Oryctes rhinoceros*) is the most serious at the present time in several South Pacific territories.

Political and land tenure uncertainties in some South Pacific territories also discourage such long-term fixed investment as the replanting and extension of coconut plantations. This is particularly so where ownership or control lies with Europeans or others who do not intend to reside permanently in the territory concerned, or are unsure of their future national or land-holding status.

The development of coconut groves on islanders' smallholdings is not seriously restrained by the financial investment difficulties and the long-term uncertainties now curtailing development on estates. Nevertheless, the eight to ten years which must elapse between planting and the first harvesting of coconuts is a major discouragement to native growers also. Much physical effort must be expended in protecting newly-planted coconuts on smallholdings without clearly-related cash returns, and so the islanders also tend to look to alternative crops for securing additional cash incomes.

Even where coconut groves have been established by islanders, lack of adequate maintenance results frequently in the overgrown, overcrowded groves of low productive capacity that are a rather typical feature of native agriculture in the region[3]. Traditional land tenure difficulties, as well as general disinterest in the long-term advantages of coconut cultivation, are partly responsible for these poor standards, which often contrast with the relative efficiency exhibited in the growing of short-duration food and cash crops under local conditions.

Copra being dried on a rack over a slow fire. Trobriand Islands, Papua and New Guinea.

Inadequate knowledge of the methods and advantages of efficient coconut husbandry are now recognized as basic problems among the islanders in rural areas.

Coconut Improvement Projects

Territorial agricultural services, copra marketing boards, and some credit agencies in various territories are actively concerned with improving standards of coconut cultivation as well as with increasing efficiency in copra processing and marketing in the areas they serve. In this article it is possible briefly to describe merely the forms of this assistance generally, concluding with a more detailed outline of a comprehensive conservation project now operating in French Polynesia and recent proposals for general rehabilitation of the industry in Fiji.

Several agricultural services and specialized agencies such as the Tonga Copra Board provide technical help and essential materials for the construction of improved copra driers for native smallholders, sometimes in association with special credit arrangements. In addition to these services, longer-term credit for coconut replanting or development is available for European planters and islanders in certain territories where special rural credit facilities exist, including the three New Guinea territories, Fiji, the Solomon Islands, and French Polynesia.

Government, co-operative and marketing-board support for the maintenance and extension of regular transport services has played an important part in stimulating copra production in some areas.

In addition to the promotional activities mentioned above, in French Polynesia a compulsory rat-banding and tree-thinning project has been in operation for some years under which all plantations, groves and individual palms are being dealt with in orderly progression. The scheme, which at present includes all of the "high" islands of the territory, requires owners to thin out over-crowded plantations to a maximum density of 150 trees per hectare prior to the actual banding to ensure effective operation of this type of rat control. No compensation is paid for surplus palms thus eliminated, but the aluminium banding material is supplied free of charge by the Administration, plus a special cash bonus of 3 francs CFP per tree which is paid to owners for the banding work completed in a manner approved by the Department of Agriculture.

Rat damage to growing coconuts is responsible for serious losses in many areas of the South Pacific. In French Polynesia, it is estimated that this project will permit an overall average increase in coconut production of some twenty per cent per annum. Finance for the project, formerly obtained from the proceeds of a small copra export tax, is now provided by the French Govern-

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3 As indicated in the following extract from the 1959 Burns Commission Report, neglect and overcrowding are not limited exclusively to native agricultural practices:—

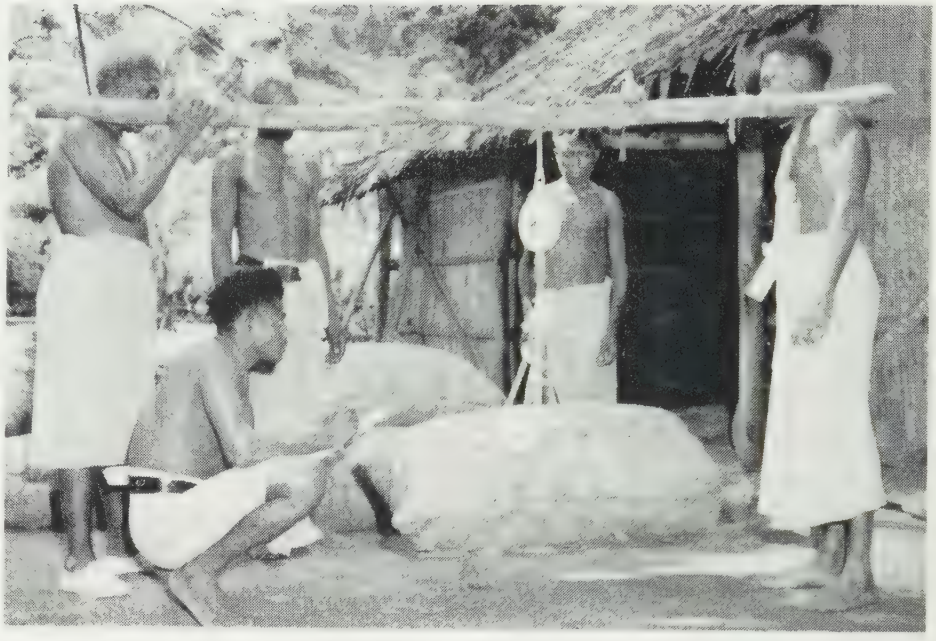
"312. The poor average copra yields—estimated at 5 cwt. per acre from estates and 4 cwt. per acre from Fijian groves—indicate to us that there is very considerable room for improvement in the Colony's second largest export crop, particularly when we know that the few efficiently-run estates obtain yields of 8 cwt. to 10 cwt. per acre. Indeed, from the appearance of many plantations, particularly on Vanua Levu, we were not surprised that copra yields are low. All too frequently they were either overgrown with thickets of guava, lantana and rough lemons, or so overcrowded with younger self-set palms from fallen nuts as to make these almost barren and the older palms poor yielding."

ment authorities through an annual grant.

Experiments on tree densities for rat-control purposes under atoll conditions are now proceeding as a preliminary operation in plans for extending the project to the "low" islands of French Polynesia, where it may be feasible to adopt maximum density standards somewhat higher than 150 palms per hectare now applying to the "high" islands of the territory.

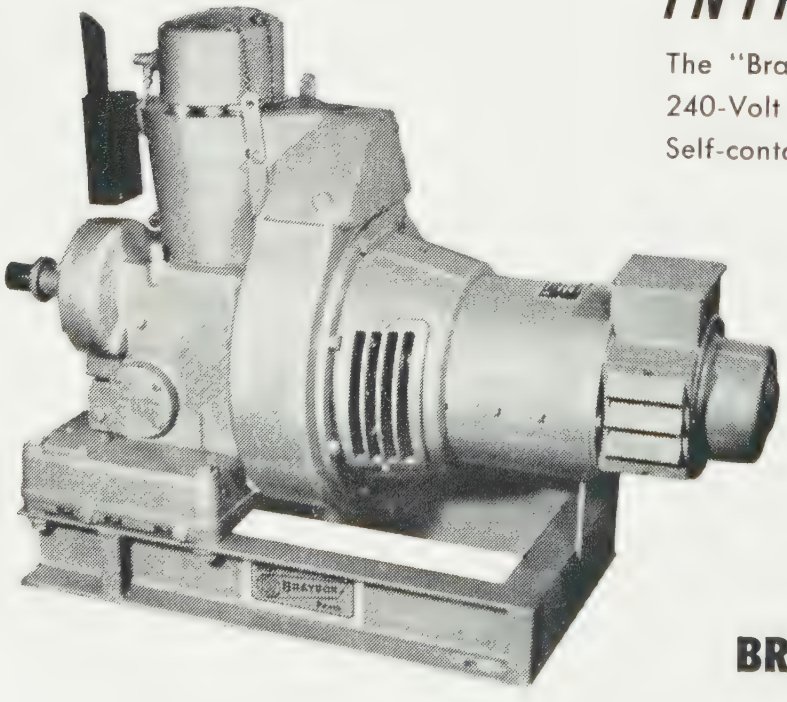
To meet the needs of the coconut industry in Fiji, the 1959 Burns Commission of Enquiry recommended a replanting subsidy scheme with the object of ensuing the planting or replanting of some 4,000 acres per year in a five-year trial basis. Under this scheme, planters would be refunded the cost of planting and replanting at the rate of £F 4 per acre, plus the cost of maintenance at £F 3 per acre, over a period of seven years, from a fund to which producers and the Government would be required to contribute in equal proportions. An allowance at the rate of £F 5 per acre for clearing a total of 12,000 acres is also included in the scheme.

It was recommended that the contributions from growers should come from a levy of £F 1 per ton on all copra produced so long as the local price of copra does not fall below £F 50 per ton, with contributions rising to £F 1/5/- per ton when the price of copra is £F 60 per ton or over.



Weighing bagged copra at a co-operative depot. Kavieng, New Ireland.

The Commission suggested that the contributions to this fund from Fijian producers should be offset against the cess of £F 10 per ton now being levied compulsorily and paid to the credit of their accounts in the Fijian Development Fund. These recommendations have been accepted, and it has been agreed that the scheme will operate under the general supervision of Fiji's Director of Agriculture in consultation with the Colony's Agricultural Advisory Council.



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Participants and observers who attended the Conference of Territorial Health Directors on Health Education. Front row (l. to r.): Dr. L. O. Roberts, Miss L. J. Martin, Dr. F. W. Clements, Dr. T. T. Romans (Chairman), Dr. R. Seddon (Acting Secretary-General, South Pacific Commission), Dr. Dorothy Nyswander, Dr. W. Norman-Taylor. Middle row (l. to r.): Dr. A. B. Roberts, Dr. C. N. D. Taylor, Dr. A. R. Edmonds, Dr. H. E. Macdonald, Dr. G. Hoekstra, Dr. W. H. Rees, Dr. R. K. Bowman, Dr. Jacques Barrau. Back row (l. to r.): Dr. W. M. Peck, Medecin Capitaine B. Colin, Medecin Colonel L. Caillard, Medecin Colonel Morin, Dr. E. J. Wright, Dr. Delmar Ruthig, Dr. S. Tapa.

SPC Conference Of Territorial Health Directors

Health education of Pacific peoples was the main topic discussed at a conference of directors of territorial health services held recently at Commission headquarters in Nouméa. Health education is being given increasing attention by the Commission and, arising out of this meeting, more effective assistance in this field will be afforded to territories.

By W. NORMAN-TAYLOR*

AT its annual session last October, the South Pacific Commission directed the convening of a conference of directors of territorial health services, primarily to discuss the development of health education activities in the region. This meeting, which was held at Commission headquarters in Nouméa from May 15-24, signalled an important step forward in health progress and co-operation in the Pacific. This was the first time that heads of the majority of health services in the Pacific had met to discuss selected common problems. This meeting will, it is hoped, be the first of a regular series.

The Conference agenda was chiefly devoted to the health education of the public. Both the Commission itself, and the territorial governments, have been giving increasing attention to this important subject in recent years, as it is realized that little further progress can be made in public health without the full co-operation and active interest of the people themselves.

Dr. T. T. Romans, Chief Medical Officer of the Cook Islands, was elected Chairman, and ably steered the discussions. The interest of delegates centred mainly round the organizing arrangements that are necessary to ensure an effective health education service within territorial health administrations, and in

* Acting Executive Officer for Health, South Pacific Commission.

SPC CONFERENCE OF DIRECTORS OF TERRITORIAL HEALTH SERVICES

TERRITORIAL PARTICIPANTS:

AMERICAN SAMOA—Dr. **Delmar Ruthig**, Director of Medical Services.

BRITISH SOLOMON IS.—Dr. **A. B. Roberts**, Medical Superintendent, Central Hospital, Honiara.

COOK ISLANDS—Dr. **T. T. Romans**, Chief Medical Officer.

FIJI—Dr. **A. R. Edmonds**, Principal, Central Medical School, Suva.

GILBERT AND ELLICE IS.—Dr. **R. K. Bowman**, Chief Medical Officer.

GUAM—Dr. **W. M. Peck**, Chief Public Health Officer.

NETH. NEW GUINEA—Dr. **G. Hoekstra**, Director of Health.

NEW CALEDONIA—Medecin Colonel **L. Caillard**, Directeur de la Sante et de l'Hygiene Publique en Nouvelle-Caledonie et Dependances.

NEW HEBRIDES—Dr. **W. H. Rees**, Senior Medical Officer, British Service.

Medecin Capitaine **B. Colin**, Medecin-Chef de l'Hopital de Tanna.

PAPUA & NEW GUINEA—Dr. **E. J. Wright**, Assistant Director of Public Health (Medical Training), Department of Public Health.

FRENCH POLYNESIA — Medecin Colonel **Morin**, Chef du Service de Sante de la Polynesie Francaise.

KINGDOM OF TONGA—Dr. **S. Tapa**, Chief Medical Officer.

U.S. TRUST TERRITORY—Dr. **H. E. Macdonald**, Director of Public Health.

CONSULTANTS:

Dr. **F. W. Clements**, M.D., D.P.H., D.T.M., F.R.A.C.P., Senior Lecturer in Child Health, Institute of Child Health, and University of Sydney, Sydney.*

Dr. **Dorothy Nyswander**, Ph.D., Emeritus Professor of Public Health Education, University of California, Berkeley.

COMMISSION PARTICIPANTS:

Dr. **W. Norman-Taylor**, Acting Executive Officer for Health.

Miss **Leonie J. Martin**, Health Education Officer.

Dr. **Richard Seddon**, Executive Officer for Social Development.

Dr. **Jacques Barrau**, Executive Officer for Economic Development.

OFFICIAL OBSERVERS:

NEW ZEALAND—Dr. **C. N. D. Taylor**, M.B., Ch.B., D.P.H., M.P.H., Director, Division of Health Education and Maternal Welfare, Department of Health, Wellington.

WORLD HEALTH ORGANIZATION—Dr. **L. O. Roberts**, M.D., M.R.C.P., M.P.H., WHO Representative, South Pacific Area, Sydney.

* Dr. Clements was also official observer for the International Union for Health Education of the Public.

particular, the ways in which the South Pacific Commission can assist territories in developing such services.

The Conference had the benefit of the advice of two consultants who had been invited by the Commission to attend. They were Dr. Dorothy Nyswander, who is Emeritus Professor of Public Health Education, University of California, and Dr. F. W. Clements, Head of the Department of Child Health in the School of Public Health and Tropical Medicine, University of Sydney.

In addition, Dr. L. O. Roberts attended as official observer for the World Health Organization, and Dr. C. N. D. Taylor in a similar capacity for the Government of New Zealand.

Pacific Fish Poisoning Study

A visitor to Commission headquarters in May was Professor A. H. Banner, head of the marine biology laboratory of the University of Hawaii, who is at present engaged on a study of fish poisoning in the region. The existence of poisonous fish could have a serious effect on the development of the fishing industry in some parts of the Pacific, where the fear of poisoning prevents full use being made of this valuable source of food. There is as yet no simple method of determining which fish are poisonous, and further research along these lines will be welcomed throughout the Pacific. The South Pacific Commission will assist the University of Hawaii with part of its studies on the subject.

FAO Plant Protection Specialist Visiting Pacific

With the main purpose of studying specific problems of plant quarantine in the region, Mr. A. Johnston, FAO regional plant protection specialist, is spending six weeks in the South Pacific.

After visits to Papua and New Guinea, New Caledonia and the New Hebrides, Mr. Johnston arrived at Commission headquarters on May 17 for discussions with the executive officer for economic development, Dr. Jacques Barrau. He left on May 31 to visit Fiji, American Samoa, and Western Samoa before returning to his headquarters in Bangkok.

Mr. Johnston is working in close collaboration with Mr. B. A. O'Connor, senior entomologist with the Fiji Department of Agriculture and SPC consultant on plant protection matters, who is at present making a survey for the Commission of the present status of territorial plant quarantine regulations and facilities.

Mr. Johnston (right) with Dr. Barrau at Commission headquarters.

SPC Officer Re-Surveys New Hebrides Shell Beds

Mr. Louis Devambez, SPC assistant fisheries officer, recently spent four weeks in the New Hebrides re-surveying trochus and green snail beds that he had previously inspected in 1959 at the request of the Administration. The beds had been closed early in 1958 after years of overfishing had caused serious depletion.

Mr. Devambez's latest survey revealed an encouraging picture. Green snail, which he found was very scarce in 1959, is now abundant on some of the southern reefs. Trochus is making a slower recovery, though considerable improvement was noted.

Size limits recommended for enforcement when shelling is resumed are such that any shell taken from the reef will have had a chance to breed for at least two years. Thus, there will be at least one young trochus or green snail growing on the reef to replace every adult taken.

An aerial view of Adi Cakobau School and the Waimanu River, with Sawani village in the right foreground.

Rural Progress Through Village Clubs

In 1960, a programme of instruction in the practical aspects of forming and running clubs was introduced at the Adi Cakobau Girls' High School for Fijians, near Suva. As a result, pupils and staff have since helped to form and run clubs for the young people and adults of three nearby villages.

By MARJORIE STEWART*

THE Adi Cakobau (Andi Thakombau) Girls' High School for Fijians is situated near the village of Sawani, twelve miles from Suva. The village is old and dilapidated, gardens are worked out, and such is the poverty of the soil that the majority of villagers buy their staple food from Indian gardens at exorbitant prices. Malnutrition is prevalent. For lack of competent traditional leadership the boys and girls are not sufficiently employed in communal duties, nor have they the initiative to break away into independence. They are untrained and frustrated, houses are decayed and overcrowded.

In 1960 the principal of the adjoining residential secondary school decided to do something positive about the problem. Apart from the pressing need of the village, it was evident that scholars who were passing through the Adi Cakobau School, although theoretically enthusiastic about serving their people, did not know where to begin. They lacked the technique necessary for a practical approach to Club work, not quite knowing how to serve their community by assisting those who have not enjoyed the same educational advantages.

Those old scholars lucky enough to be absorbed into the ever-widening activities of the newly-opened Women's Interests Office were thoroughly enjoying the work and proving an asset, but the loss of incipient leadership through the years could not be ignored.

Junior English-Speaking Club

Accordingly, in 1960 instruction in club work was started in Class 8 (Form II)—the last year of the primary school. It was taken as part of the school curriculum in English, and was run entirely by the class for the class. It was called the Junior English-Speaking Club, and its aims are: To improve the class English; to learn how to run a club; to prepare for running an English-speaking club in the Sawani Village School.

The programme is based on regular club procedure, the chief activity being some aspect of English—a discussion, one-minute impromptu speeches, a debate, a competition for the best five-minute dialogue (two weeks' notice), a special speaker who is introduced by the chairman and thanked from the floor, dramatization of manners, a competition for the best short story, the best original play—the actresses being trained by the playwrights.

Different members of the executive

At a recent function organized by the Waimanu Girls' Club, the girls baked the cakes and prepared the sandwiches.

* Women's Interests Officer, South Pacific Commission. Miss Stewart recently visited Adi Cakobau School, and she later prepared this article mainly from material supplied by the leaders of the clubs whose activities she reviews.

Above: Members of the Waimanu Mothers' Club at work on one of their gardens near the Sawani village church. Right: Members of the Waimanu Boys' and Men's Club following up an extensive fencing programme by draining a swampy area in Sawani village. On the right is their instructor, the farm overseer at Adi Cakobau School.

make themselves responsible for conducting the singing, the roll call, the prayer, the indoor game, while the chairman attends to the routine, calling on activity leaders in turn. The small subscriptions are used for the purchase of prizes for the main activity, the treasurer thus getting practical experience in the keeping of accounts.

Despite the sacrifice of one of the two English composition lessons weekly, this group of thirty topped Fiji in English in the Colony's Secondary Entrance Examination at the end of the year.

In 1961 this same class, now in their first year in the secondary department, is already well launched in conducting a similar club for Classes 7 and 8, boys and girls, in the neighbouring Sawani Village School. For the first month the Club was run in vernacular so as to clarify its aims and routine, but from April onwards the pupils in the village school wanted it conducted in English in order to assist their fluency. They are very enthusiastic, and the head teacher declares there will be no absences on Thursdays. It is hoped that by introducing club procedure and organization to young villagers of fourteen and fifteen years, a few individuals may be inspired not only to join the girls' and boys' post-school club, but also to take an active part in leadership.

Waimanu Girls' Club

Simultaneously in June, 1960, a number of secondary pupils from Forms IV, V and VI who were called together, elected a small committee to act as convener and leaders in the formation of a girls' club for girls between fourteen and twenty years of age from the three surrounding villages, all within a four-mile radius of the school. As a result the Waimanu Girls' Club was formed, meeting weekly for two hours.

It was decided to utilize the facilities the school could offer: well-equipped rooms for teaching cooking and dressmaking, a model housekeeping bure, and adequate playing fields. Twenty-four members were enrolled at the first meeting, and quickly grew to thirty plus an older overflow who then became the Waimanu Mothers' Club.

The programme of the Girls' Club is planned by the committee elected by the members: sewing, cooking, gardening, singing, Fijian crafts and dancing. The weekly subscription is 3d. to cover the expenses of cooking demonstrations and certain equipment.

The Club is divided into two groups who do sewing and cooking simultaneously and change over after six weeks. Cooking lessons concentrate on the use of local foods and vegetables, the preparation of food for infants and invalids, methods of baking in the village home, and lessons on food values. That the girls take a lively interest in the Club activities is evident from their healthy attendance. The girls hope to continue to make gardens in their villages, and in cooking to learn how to make better use of local vegetables and fruit. In sewing they are ambitious to make shirts, trousers and pretty frocks. The motto of the Club is: "Tide does not wait."

Waimanu Mothers' Club

As a result of the overwhelming number of girls who attended the first few meetings, the senior Fijian mistress agreed to separate the older women by forming the Waimanu Mothers' Club. This was formed on October 31, 1960, and by the end of the year there were 46 members who meet fortnightly in the village school. The Club is divided into four groups for activities and stimulating competition. The fortnightly subscription of 1d. for Club funds is augmented by group earnings through the sale of vegetables and prawns. The programme is similar to that of the girls' Club, including particularly demonstrations in "pot-baking." A new flower garden round the church provides flowers for Sunday services.

This year the Club has made a fine start by raising £30 towards a sewing machine through organizing a dance in the nearby township of Nausori, as well as by recording for broadcasting a number of old "meke" chants and chanted psalms. They co-operated with the men's Club in beautifying paths and roads that the men had made. The Club members are resolved to form branches in the two neighbouring villages in 1961.

Both the Girls' and the Women's Clubs receive pamphlets on club activities from the Women's Interests Office, to which some of the leaders go from

(continued on page 62)

Participants who attended the Second Technical Meeting on Co-operatives. Front row (l. to r.): Mr. Tofiga Ah Chong, Mr. R. H. Boyan, Dr. Richard Seddon, Mr. F. E. M. Warner (Chairman), Mr. J. E. O'Meara, Mr. J. L. Noakes, Mr. Kelsey B. Gardner, Mr. B. J. Surridge. Back row (l. to r.): Mr. H. H. Jackman, Mr. J. Poissenot, Mr. V. D. Stace, Mr. F. Doyen, Mr. M. B. Hamilton, Dr. P. J. van Dooren, Mr. L. Rumen, Mr. Francis Mahoney, Mr. Manuel Calvo, Mr. M. D. Allen, Mr. I. V. Cartledge.

Second SPC Meeting On Co-operatives

Ten South Pacific territories were represented at the Second Technical Meeting on Co-operatives held at Commission headquarters in Nouméa from April 13-26.

By RICHARD SEDDON*

FOR two weeks during April the South Pacific Commission, in collaboration with the Food and Agriculture Organization of the United Nations, convened at its headquarters in Nouméa its second technical meeting on co-operatives in the South Pacific. (The first was held at Port Moresby in 1958.)

On this occasion three of the Commission's participating governments—Australia, the United Kingdom and the United States—were represented by official observers, while FAO, the collaborating body, was represented by its agricultural co-operatives specialist and by a consultant specially appointed for the meeting. Ten Pacific territories were directly represented.

The meeting first considered a variety of problems associated with training and education in the field of co-operation—the training of staff government co-operatives departments, the training of directors, office-bearers and employees of co-operative societies, and the education of members. Attention was also given to the question of co-operative education within the community generally.

The meeting then studied in detail the role of co-operatives of all kinds in stimulating higher levels of savings and investment in Pacific Island communities, particularly in relation to the acquisition and maintenance of productive equipment such as trading vessels, trucks, tractors, etc. Special attention was given to the organization of thrift and credit societies by co-operatives to provide capital for productive loans.

At its final plenary session the meeting adopted for transmission to the Commission a comprehensive report outlining the course of its discussions and incorporating specific recommendations for the consideration of the Commission.

* Executive Officer for Social Development, South Pacific Commission.

SECOND TECHNICAL MEETING ON CO-OPERATIVES: PARTICIPANTS AND OBSERVERS

TERRITORIAL PARTICIPANTS:

BRITISH SOLOMON ISLANDS—Mr. **M. B. Hamilton**, Registrar of Co-operative Societies.

FIJI—Mr. **F. E. M. Warner**, M.B.E., Registrar of Co-operative Societies.

GUAM—Mr. **Manuel Calvo**, Director of Agriculture.

NETHERLANDS NEW GUINEA—Dr. **P. J. van Dooren**, Chief of Bureau for the Development of Native Commercial Enterprise.

NEW CALEDONIA—M. **Raymond Cassier**, Chief, Co-operatives Technical Assistance Service.

NEW HEBRIDES (British National Administration)—Mr. **M. D. Allen**, District Agent, Central District No. 2.

NEW HEBRIDES (French National Administration)—M. **F. Doyen**, Chief Co-operatives Officer.

PAPUA & NEW GUINEA—Mr. **H. H. Jackman**, Registrar of Co-operatives, Department of Native Affairs.

TRUST TERRITORY OF THE PACIFIC ISLANDS—Mr. **Francis Mahoney**, District Administrator, Palau District.

WALLIS ISLAND—M. **J. Poissenot**, Chief, Agricultural Sector.

WESTERN SAMOA—Mr. **Tofiga Ah Chong**, Co-operatives Officer, Prime Minister's Department.

F.A.O. PARTICIPANTS:

Mr. **J. E. O'Meara**, Agricultural Co-operatives Specialist, Rural Welfare Branch of FAO's Rural Institutions and Services Division.

Mr. **J. L. Noakes**, M.B.E., FAO Consultant.

COMMISSION PARTICIPANTS:

Mr. **R. H. Boyan**, Co-operatives Officer.

Mr. **V. D. Stace**, Acting Executive Officer for Economic Development.

Dr. **Richard Seddon**, Executive Officer for Social Development.

OFFICIAL OBSERVERS:

AUSTRALIA—Mr. **I. V. Cartledge**, Department of Territories, Canberra.

UNITED KINGDOM—Mr. **B. J. Surridge**, C.M.G., O.B.E., Adviser on Co-operation to the Secretary of State for the Colonies.

UNITED STATES OF AMERICA—Mr. **Kelsey B. Gardner**, Director, Management Services Division, Farmer Co-operative Service, United States Department of Agriculture.

"Coralite" For Cheaper Building In The Islands

In a series of experiments extending over the past nine years, the author has developed a method of processing coral to provide a cheap and efficient building material. In the Cook Islands, "Coralite" has been accepted as the standard building material for public buildings, and it is also widely used for homes, offices, stores, and a variety of other buildings. Costs are considerably below those for cement construction.

By WINTON H. RYAN*

London Missionary Society Church, Avarua, Rarotonga. Built one hundred and twenty years ago, this church is an excellent example of the mission-introduced system of using burnt coral and sand to bind coral boulders. Note heavy buttresses. Walls are three feet thick.

OVER a century ago missionaries of the London Missionary Society introduced a new building technique to the Cook Islands—the use of coral lime. They burned raw coral into lime, and then made a mortar of lime, salt water, and beach sand. This mortar was used to bind together the large coral rocks which formed the basis of their system of construction.

Vines and various roots were sometimes used for reinforcing, but the strength really lay in the thickness of the walls—about 30" for large buildings and a minimum of 18" for small. Although some of the buildings so erected are today over 130 years old, and have long since been unroofed by storms and decay, the coral walls are still standing.

Backlog Of Post-War Construction

After the second World War the Cook Islands, in common with other Pacific territories, were faced with a backlog of construction. This together with the provision of new services led to an unprecedented demand for new buildings.

At that time, however, cement and other imported materials were in extremely short supply. Experiments in the use of local materials were therefore begun. Coral was the most obvious and most readily available material. However, the system of using it as introduced by the missionaries involved too much labour and excessive quantities of material, owing to the extreme wall thickness.

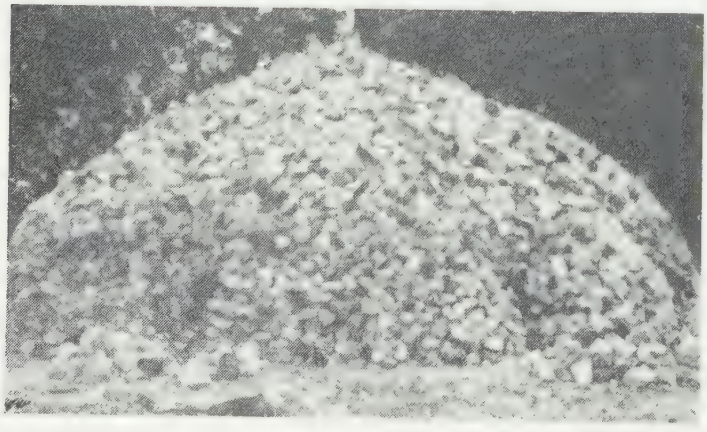
A construction technique was sought possessing the following features:

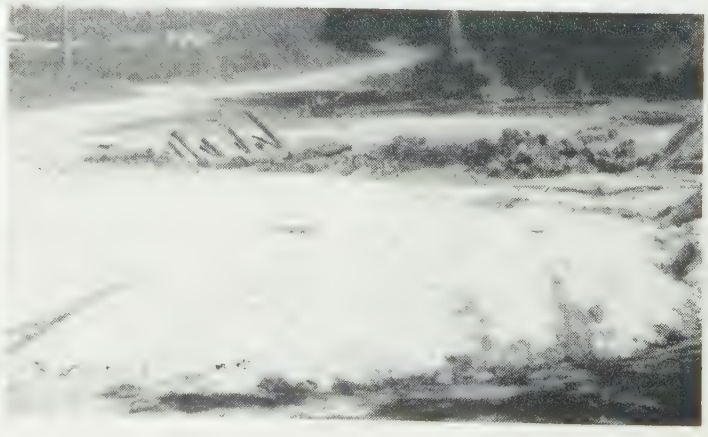
(i) Ready availability of material;
(ii) low cost of construction;
(iii) simple building methods needing a minimum of trained staff;
(iv) permanence and neatness.

The system developed, and outlined in this article, meets all these requirements. In fact, it has been so successful that while alternative imported materials are now readily available, Coralite has been accepted as the standard building material for public buildings

Mr. Ryan is Superintendent of Works to the Government of the Cook Islands. It is in this capacity that he carried out the research outlined in this article.

Below: A pit ready for firing. Note the lighting ports which also act as air vents during burning. As the coral boulders disintegrate, and as the wood below them burns, the whole mass settles slowly into the pit until it is left full of pure lime. Below right: Two lime pits side by side at different stages. In the far one, coconut and other logs have been placed ready for the raw coral boulders to be heaped on top. In the near pit is the finished product—about 250 x 44-gallon drums of lime.





A staff residence being built. The man on the barrow keeps two men occupied tamping the mix to preclude any voids in the mass. The technique is simple, and the whole construction is carried out by Rarotongan labour—no European staff at all are employed on this job.

in the Group. It has been found suitable for houses, schools, offices, stores, workshops and other structures.

In addition, it has been found to possess two other advantages which were not foreseen earlier. The first is that many islanders have copied the method in building their own houses, shops and sheds. As the main cost involved is that for labour, families find that by providing this themselves they can have much improved housing at very low cost.

The second advantage is that whereas money spent on cement and other materials is lost to the Group, money expended on Coralite construction benefits the local economy and gives employment to many islanders in the preparation of the lime. Many of these men would otherwise be unemployed.

Lower Building Costs

Since 1951 Coralite has been used for some 153,380 square feet of construction. This represents 42% of the total Government building programme carried out during this period. The latter includes 26 residences for European staff, school rooms, Government offices, cottage hospitals, dental clinics, etc. All these buildings are in perfect condition and there is no sign of deterioration. Production cost of lime (based on present rate of 11/6 per day for unskilled labour) is £4/8/- per ton. By comparison, Portland cement costs £21 per ton to land in the territory (prices by ton volume).

Coralite buildings cost from 21/6 per square foot for simple stores and workshops to 35/- for residences for European staff. These costs are considerably below those for cement construction.

Selecting And Burning The Coral

All forms of live coral when burnt will produce lime suitable for mixing with aggregate for construction purposes. However, undoubtedly the most suitable are the solid but soft niggerheads found in such abundance in all lagoons. Methods employed in harvesting these include pulling with wires attached to tractors. More frequently, gangs of men equipped with heavy hammers break them into pieces which can be carried ashore.

There are also many forms of dead coral suitable for burning. These are recognizable by their fine, closely-grained, white compositions. In this form the coral is no longer soft, but is extremely brittle and splits easily under blows from a hammer or axe. Such deposits are found on the surface and are undoubtedly from coral heads broken during hurricanes and washed inland by heavy seas.

Extensive deposits of high-grade lime coral are to be obtained by quarrying the makatea walls found on all islands of volcanic origin. Unless, however, the quarrying is incidental to some other work (road or reef access cuttings), this source of supply would be uneconomical.

Coarse-grained rock, containing shells and other detritus, should be discarded, as too much fuel will be required to reduce it to usable lime and much dross will remain.

The fuel used is a mixture of fast-burning timber (usually coconut) with other local slow-burning timbers. The coconut timber maintains combustion of

Below: Administrative headquarters, Mangaia Island. This building of 3,800 square feet incorporates post office, radio station, police office, co-operatives office, courtroom, resident agent's office, and clerical accommodation. The walls are of uniform height, with a monopitch roof sloping to the back of the building. Foundations are of concrete and the rest of the building is of Coralite. Below right: A modern four-room school block in Coralite. The Nikao School at Rarotonga was erected in 1953 and was the first school to be built in Coralite. The design incorporates new features in lighting and ventilation.

Above: A set of three Coralite staff residences being built. This class of construction, including all internal fittings, costs about 35/- per foot complete. Living room and lounge face the road, with bedrooms and service rooms on the far side. Right: Joinery factory at the Cook Islands Public Works headquarters, Rarotonga. This is one of a number of workshops, stores and offices which comprise the depot of some 42,000 square feet. The whole depot was constructed in Coralite at a cost of 21/- per foot.

the latter, which in turn prevent the coconut from burning away too quickly.

The fire is screened by tarpaulins rigged on the windward side. This prevents the fire from being forced to one side of the pile, and ensures even burning.

The fuel logs are laid in right-angled rows, with fallen fronds, husks, etc., layered between to act as kindling. Six lighting ports (they are fired simultaneously) are left around the pile. These also act as vents. Spare piles of coral are spaced around the pile, and during burning these are thrown on to patches where the fire breaks through.

During the first day's burning, men are in attendance with poles to prod the hot rock and thus help the breaking-up process.

As Coralite construction is constantly continuing in Rarotonga, it follows that the production of the lime itself has become quite an organised procedure. We have three pits, each with a capacity of 240 x 44-gallon drums working in rotation—number one is burning, number two is being prepared, while number three is being drawn off.

The pits burn for an average of eight days. After the second day they are sprayed with fresh water during normal working hours.

The Formula

There is some difference in the method used and materials available in different islands, but the basic formula is 6 parts ½″ metal to 4 parts ¼″ "all in" metal to 2 parts lime pug, measured by volume.

In Rarotonga there is a quarry with a large crushing plant producing different grades of basalt chips. In other islands where we have a large construction programme proceeding (boat harbours, schools, hospital buildings, administration blocks, staff residences, etc.) we establish a crushing plant and process coral as a substitute for metal chips.

Where only isolated small buildings are required, and machinery is not warranted, a different procedure is used. This is particularly useful on atolls.

Many experiments were carried out, and it was found that by mixing lime pug with metal aggregates in concrete mixers as for normal concrete (instead of making a mortar) a much stronger wall could be obtained with a reduction of thickness. From these experiments, mix No. 9 was evolved. It is this mix (which is described above) to which we have given the name "Coralite" to distinguish it from Portland cement concrete, and from other coral construction.

Mixing Procedure

As mentioned elsewhere, the best grade of prepared lime is of the consistency of thick pug, and in this stage it contains the quantity of water most desirable for a high-grade mix. It follows therefore that whatever aggregate is used, the mix will be hard to work, and a powered mixer is necessary.

It is true that some local builders on private work often mix by hand in various containers (an old canoe seems to be the most favoured) and add water to make the mix more workable. For public buildings, however, we prefer a higher standard and use 1/3 to 1/2 cubic yard capacity machines.

It should be noted that although lime while left in the pit will retain the correct moisture content for years, it soon dries out when removed. We therefore only extract sufficient at a time for immediate requirements.

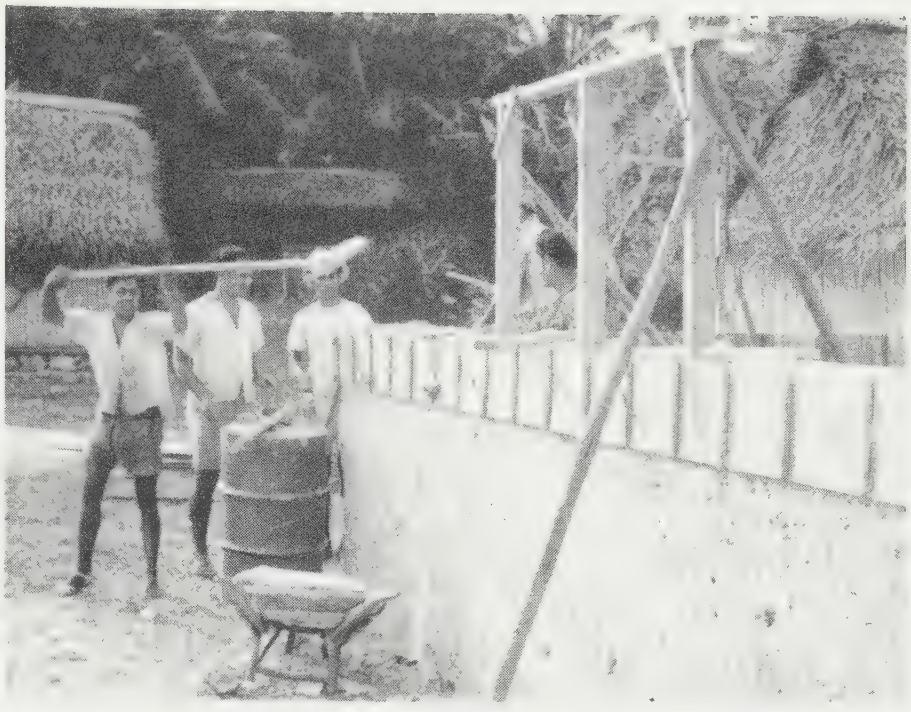
The density of the mix depends on the aggregate used but is roughly in the proportion of 1-5, and is measured in 12″ square boxes.

Placing The Mix

This operation is similar to ordinary concrete pouring. The forms used are flattened 44-gallon fuel drums with 3″ x 2″ timber framing. Timber—even sawn coconut planks—may be used of course, but if there are a number of buildings, the drum type of formwork will be found to be the most economical.

Wheelbarrows convey from mixer to shuttering. Vibrators are not used, but two men with heavy tampers are needed to cope with the output of one wheelbarrow. This is hard work owing to the density of the mix, and requires careful supervision if voids in the mass are to be avoided.

An alternative design for low-cost schools in Coralite. This type of block (including ceilings and internal fittings) is erected at a cost of 25/- per foot.



Coralite construction is becoming popular with islanders wishing to build permanent low-cost homes. Here a family on Mangaia is building a home. The Coralite was not machine-mixed, but otherwise the methods outlined in this article were followed in its preparation.

The formwork is best held in position by bolts, which can be used over and over again. These bolts should be gently loosened by turning on the day following pouring; otherwise, if left until the removal of the formwork, it will be found that there has been sufficient adherence to the bolts to cause a partial collapse of the face at the point of withdrawal. This is not serious, but as it can be easily avoided it is as well to do so.

If there is any likelihood of rain after pouring, the formwork is covered with old iron or by any other means available. In fine weather, particularly if exposed to wind, formwork may be lifted after three days.

As Coralite is air-cured (as opposed to Portland cement, which is water-cured) the setting process is expedited after the shuttering is removed. The refixing of the formwork will take, on an average-sized building, about two days, so that the second pouring may commence on the sixth day after the completion of the filling of the first form.

In practice we allow three days for the setting of the first fill before lifting, four days for the second, and for the remaining lifts, five days before the shuttering is finally removed. These timings are for a 10′ stud building under favourable conditions of fine weather and exposure to wind.

It is of course assumed that a dry mix, relying on the water content of the pug alone, has been made; any variation of these conditions will naturally result in extension of the above timings.

Depth Of Shuttering

With regard to the depth of shuttering, at one stage boxing 3′ deep was used. However, this was reduced to 2′ subsequently as—

(i) a 3′ depth of Coralite took twice as long to dry out sufficiently for the next placing as did a 2′ depth, and

(ii) much more bracing and battening of shutters was required for the deeper pour. The shuttering is a comparatively expensive item in construction even when coconut wood is used, as with the necessarily narrower strips of the latter, more nails and battening are required.

If a large programme has to be carried out I consider it would be economical to have standard steel shuttering made, and in this case a 2′ pour would be best, as the Coralite would be slower drying out than with timber boxing.

Construction Details

As Coralite has a lower compression test value than Portland cement concrete, its reliability as a building medium lies in the provision of solid foundations, thickness of walls, and the capping of walls to ensure an overall distribution of weight of the roofing members. Reinforcing steel serves little useful purpose in this material, and is not used. Partitions are also of Coralite to provide lateral buttressing.

The following standards are adhered to:

(i) *Foundations.* In earth, or sand, a trench 24″ wide by 18″ deep is dug and "rough" Coralite poured to ground surface. This "rough" mixture consists of the residue of old pits and dross from the top of the pits. Large pieces of coral are mixed in with the foundations. This fill, as with all other pourings, is tamped hard.

(ii) *Foundation Band.* The formwork is centred on the filled foundation trench and the bottom 9″, under all walls including partitions, is filled with dense Portland cement concrete. Two ½″ mild steel reinforcing rods are inserted in this band at the base with a 2″ covering at the bottom.

Staff residence in Rarotonga being plastered with a mixture of lime and sand. This reduces maintenance to "painting" with lime and seawater.

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The purpose of this band is twofold. Firstly, Coralite is porous, and the dense concrete reduces capillary action in it. Secondly, it serves as a continuous firm base for the walls, guarding against possible local subsidences in the foundation trench which, if not provided against, could result in the cracking of walls. The form is then filled with Coralite without further alteration to the shuttering. When the Coralite filling is complete, selected flat, thin pieces of coral rock are centred edgeways in the filling to provide keys for the next sections. There should be roughly a 12″ gap between these keys.

(iii) *Top Band.* The construction of this item follows that of the bottom foundation band. It also has a twofold purpose. Firstly, it provides an even distribution of weight of the roof members—thus guarding against wall cracking, and secondly, it serves as an anchor for the bolts securing the roof trusses.

The holding-down bolts (of ½″ threaded mild steel with a "U" end) are 42″ in length. These bolts are anchored in the Coralite walls and pass through the concrete band securing the top plate and the truss beams by hooking over the top.

(iv) *Other Concrete Work.* A small quantity of concrete is inserted at the sides of doors and windows, in order to obtain a secure anchorage for the jamb fastenings. These are poured at the same time as the Coralite, and no stops are used in the formwork to separate the mixes. Although the concrete sets at a faster rate than the Coralite, no cracking between the two aggregates has occurred.

The need to provide concrete lintel bands affects to a considerable degree the design of the buildings themselves in that tropical habitable buildings need more openings than those elsewhere. We therefore design with a view to having the tops of all window and door openings in line and at such a height as to enable the top band of concrete (iii) to also serve as the lintel band. Floors are also of concrete.

(v) *Thickness of walls and partitions.* For well-partitioned buildings having a stud height of not more than 10′ and a width not exceeding 24″ (schools, residences, store buildings, cottage hospitals and ancillary buildings) the thickness of both walls and partitions is 12″. A joinery factory building, without partition, of 122′ by 36′ with a 12′ stud has walls 18″ thick. An office building of similar dimensions but with partitioning for a third of its length has walls 15″ thick.

(vi) *Plastering.* This is a stiff mix of 2 parts screened beach sand to 1 part screened coral lime mixed with salt water and applied with ordinary plastering tools. The mix is prepared in 44-gallon drums the day before applying. The excess water which accumulates on

top of the mix overnight is drained off. Finishing with a wood float covers up minor irregularities which would be highlighted were a smooth surface obtained from the use of steel tools. The method used to obtain an even surface (in the absence of tradesmen) is to carefully level and nail ½" thick wooden strips at the corners. A taut string moved up and down the walls, as a check, between these battens will achieve a reasonable standard. The exterior corners of the buildings are chipped free of lime, and cement plaster substituted to prevent damage. These corners are rounded.

For finishing exterior surfaces, a mixture of lime and seawater is used and, indeed, this is all that is required from time to time to maintain the white surfaces. Various flat paints, including plastics, are used for interior plastered surfaces, but it has been found that the cheap water paints are quite satisfactory, and have better colour retention than the several brands of plastic products so far used here.

SPC Plant Introduction Service Expanding Rapidly

The SPC Plant Introduction Service is playing an increasingly important part in the improvement of economic crops in the South Pacific region. In the six months ending June 30, nearly 300 species and varieties of economic plants have been distributed, as against 115 for the preceding six months.

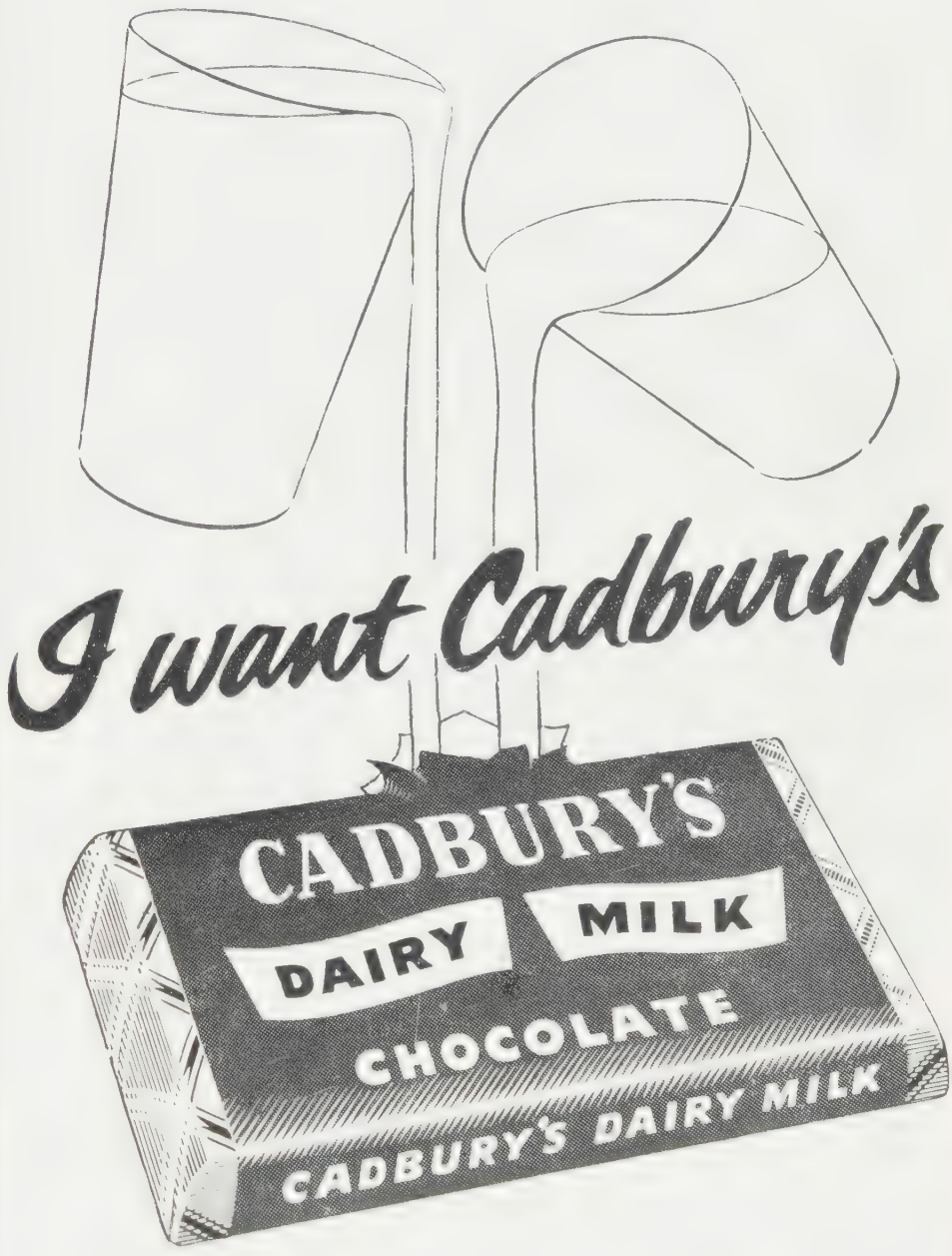
Recipient territories were American Samoa, British Solomon Islands, New Hebrides, Cook Islands, Fiji, French Polynesia, Guam, Netherlands New Guinea, New Caledonia, Niue, Papua and New Guinea, United States Trust Territory of the Pacific Islands, Wallis and Futuna Islands, and Western Samoa.

Plant material—mainly in the form of rooted cuttings, seedlings and seeds—was distributed of breadfruit, citrus, Macadamia nut, black pepper, soybean, grain sorghum, several timber species including pines, eucalypts, and teak, legumes and grasses, coconuts, rice, vegetables and pulses adapted to tropical conditions, shade trees, vanilla, and the tung oil tree.

Niue Department Of Agriculture Assists Planters

On Niue, the Department of Agriculture has disced, harrowed and top-dressed a number of half-acre blocks to assist people of the Island to obtain better crops. Well over fifty planters have received assistance so far, and as well the Department has a long waiting list. The cost of approximately £7/10/- a plot is paid back by the planters from their crop returns.

In several instances the results have been startling. The first grower to receive assistance netted £140 from a quarter-acre of kumaras grown for export — a remarkable achievement in Niue's rugged conditions.



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A promising Leucaena glauca selection in a crossbred progeny at the C.S.I.R.O. Pasture Research Station, Samford.

Tropical Pasture Research in Queensland

The work being carried out in pasture research in Queensland by the Division of Tropical Pastures of the Commonwealth Scientific and Industrial Research Organization is described in the article below. The results obtained are of direct interest to cattle graziers in Pacific territories, where there is considerable scope for scientific pasture development.

By E. M. HUTTON*

THE C.S.I.R.O. Division of Tropical Pastures is a relatively new Division in the Organization and is the only Division located north of Sydney. Headquarters are at the Cunningham Laboratory, opposite the University of Queensland at St. Lucia, Brisbane.

Dr. J. Griffiths Davies, a well-known agrostologist, is Chief of the Division, and he has working with him eighteen research officers. In addition there are six research officers of the C.S.I.R.O. Division of Soils associated with Dr. Davies' team.

The Samford Pasture Research Station, 17 miles from the Cunningham Laboratory, provides field facilities for grazing experiments with cattle, plant introduction, and plant breeding.

Fifty miles west of Brisbane, at the C.S.I.R.O. Cooper Laboratory in the grounds of Gatton College, agrostological experiments and nutritional work with new pasture legumes and grasses is done. This is a black soil area, and results obtained here are applicable to the Darling Downs and "brigalow"[1] region. A pasture research station has been developed on the coast in the sandy wallum region, 50 miles north of Brisbane, and several stations have been set up in the brigalow and spear grass areas.

All the research work of the Cunningham Laboratory is aimed at the development of pastures in the 100 million acres in Queensland which have sufficient rainfall for sown summer pastures. The results obtained by the Division will be applicable in northern New South Wales as well as in other parts of Northern Australia. Also, it is becoming increasingly evident that the results are of interest in other parts of the tropical world.

[1] *Acacia harpophylla*

Introduced Grasses And Legumes Needed

Pastures and pasture research in Queensland are still in the pioneering stage, and it has become evident that productive pastures will only be developed by replacing the native and naturalised flora with introduced grasses

* Dr. Hutton is Acting Chief of the Division of Tropical Pastures, Commonwealth Scientific and Industrial Research Organization.

A promising creeping-rooted lucerne selection from a crossbred progeny grown at the C.S.I.R.O. Cooper Laboratory.

and legumes. Thus plant introduction and the assessment of new introductions under grazing are very important preliminary phases of the programme.

Large numbers of introductions have been obtained from South America, Africa, Hawaii, southern U.S.A., India, Ceylon and Mexico. A relatively small percentage of the species introduced have proved promising because of limitations in the environment. Our winters are dry and often cold, with a few frosts sufficient to cause a marked reduction in the nutritive value of tropical species. It is very difficult to obtain tropical pasture species fully adapted to these conditions.

Emphasis On Legumes And Applied Nitrogen

Since pasture productivity and beef production are dependent to a large extent on the supply of soil nitrogen, there has been an emphasis on both legumes and applied nitrogen. Efficient legumes have been found in the genera *Desmodium, Glycine, Indigofera, Phaseolus,* and *Vigna.*

The perennial tree, *Leucaena glauca,* is a very efficient legume under grazing conditions and the level of protein in the dry matter is around 30%, while the other legumes range around 20% of protein. The best strain of *L. glauca,* Peru, gives 3,500 lbs. of protein per acre.

Lotononis bainesii is an unusual legume from Africa which has some frost tolerance and is particularly adapted to sandy soils in a high rainfall. This legume did not appear at all promising until Dr. D. O. Norris introduced its particular *Rhizobium* from Africa in nodular material. It is one of the few *Rhizobium* which forms a red colony on agar medium, and it appears to be highly specific to *L. bainesii.*

Most of the legumes being investigated, with the exception of *Indigofera spicata* and those in the genus *Phaseolus,* are rather specific with respect to *Rhizobium.* This has required an extensive research programme on *Rhizobium* in relation to tropical pasture legumes.

Mr. C. S. Andrew and Dr. Norris have shown that the majority of legumes that seem promising do not require high levels of calcium in the soil. This is fortunate, as it makes the development of legume-grass pastures much cheaper in Queensland.

Big differences exist between grass species in their response to applications of either sulphate of ammonia or urea. A species like Rhodes grass responds markedly to heavy nitrogen applications. Due to the high cost of nitrogenous fertilisers it is probable that grass-legume pastures will be developed wherever possible. In order to get maximum production under summer rainfall conditions it may be necessary to give them strategic dressings of nitrogen as well as the usual phosphate, potash and minor elements.

Agrostological Work In Four Main Zones

Agrostological work is done in four main zones at present: the coastal wallum, the spear grass, the brigalow, and the Darling Downs.

Continual progress in this work is dependent upon the basic work being done in ecology, genetics, legume bacteriology, plant nutrition, chemistry and physiology. The work on soil survey and pedology, soil chemistry, physics and fertility, provides an essential background to the whole of the pasture work.

In addition, animal nutritional work with the different pasture legumes and grasses is in progress, and it is hoped to strengthen this in the future so that in the one laboratory soil, plant and animal relationships will be investigated.

The Cunningham Laboratory — headquarters of the C.S.I.R.O. Division of Tropical Pastures.

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COASTAL WALLUM ZONE: Mr. W. W. Bryan after ten years' research in the wallum region of 3-4 million acres has now virtually solved the pasture problem. Economic considerations prevent the immediate development of the wallum, which consists of infertile sand overlying a mottled clay.

Legumes well adapted to this area include *Lotononis bainesii, Desmodium uncinatum, D. intortum,* and white clover. Provided these legumes receive in the first instance a fertiliser mixture consisting of 5 cwt. superphosphate, 5 cwt. lime, 1 cwt. potassium chloride, 7 lb. copper sulphate, 7 lb. zinc sulphate, 7 lb. borax and 2 oz. molybdenum per acre, they build up sufficient soil nitrogen to maintain high productivity in grasses like *Paspalum plicatulum* and *P. commersonii* (Scrobic). In the long term, high yield in the pastures can be ensured by smaller annual fertiliser dressings of the order of 2 cwt. of superphosphate and 1 cwt. of muriate of potash per acre. This work means that at Brisbane's back door there is a potentially valuable area for beef fattening or dairy production which could be used in the future when it becomes economically sound to develop it.

SPEAR GRASS ZONE: The coastal and sub-coastal spear grass zone of some 43 million acres is the most important cattle-raising area in Queensland.

At Rodd's Bay, near Gladstone, Mr. N. H. Shaw has shown quite clearly that the native pastures, mainly of spear grass (*Heteropogon contortus*), which carry a beast to 10 acres can be made to carry a beast to 3 acres. This is achieved by over-sowing with Townsville lucerne (*Stylosanthes sundaica*) at the rate of 2 lbs. per acre and top dressing with 1 cwt. of superphosphate per acre.

The fertilised Townsville lucerne-spear grass pastures can be maintained indefinitely, and will give live weight gains over the season of about 110 lbs. per acre, compared with a 15-lb. gain per acre on the native pasture. This is a very significant result when it is realised that Townsville lucerne is not a highly efficient legume, having a protein level around 13%.

Replacing spear grass with fertilised pastures of Rhodes grass and *P. plicatulum* in conjunction with the legumes *Phaseolus lathyroides* and *Centrosema pubescens,* Mr. Shaw has obtained a carrying capacity of a beast to 2½ acres with a live weight gain over the season of over 130 lbs. per acre. However, these legumes become reduced to a low level in the pasture after four years, with a corresponding reduction in productivity.

Considerable research is being done on other *Phaseolus* species and on the tree *Leucaena glauca,* with the aim of obtaining a legume which maintains its place in the pasture. An outstanding result from Mr. Shaw's work has been that cattle on the improved pastures continue to gain weight over the critical winter-spring period instead of losing weight, which they normally do on native pastures.

BRIGALOW ZONE: The brigalow region covers about 23 million acres and until recently half of it was covered by brigalow (*Acacia harpophylla*). Since the soils are grey and brown and relatively fertile, brigalow is being cleared from them at an increasing rate.

As a result of the work done by Dr. Davies and Mr. L. A. Edye, a pasture mixture comprising *Sorghum almum* and lucerne has been developed for this region and is capable of carrying a beast to the acre over about four years. In order to maintain the productivity of *S. almum* it is essential to develop summer legumes capable of growing with it and supplying adequate quantities of soil nitrogen. Promising results are being achieved with new types of *Phaseolus* and *Glycine javanica.*

It may be a few years before this summer legume problem is solved, but when this is achieved the brigalow region will become one of the most productive areas in Queensland. New strains of Buffel grass, *Panicum coloratum,* and Rhodes grass are showing distinct promise for this area.

It is considered that pulse crops like cowpeas, soya beans or mung beans could be grown and fed back during the critical winter period to overcome the protein drought most animals suffer. Often there is sufficient dry matter for cattle so that suitable protein supplement would prevent the usual loss of live weight during the winter. Research done so far has indicated that soya beans give the highest yields of protein per acre of any of the pulse crops. At the Cooper Laboratory, yields of 1,800 lbs. of seed per acre have been obtained with the best soya bean strains.

Basic Work On Soil Fertility

Now that pastures have been developed in various areas, basic work on soil fertility has been commenced.

This work will be greatly aided by the recent installation of a mass spectrometer which is a £9,000 gift from the Rockefeller Foundation of U.S.A.. Dr. A. E. Martin and Dr. E. F. Henzell will be using this for nitrogen isotope assays in connection with research on the movement of nitrogen between soil and pasture. In addition, they will be able to study the fixation of nitrogen by the new pasture legumes being developed.

Plant Breeding And Genetics

Research in plant breeding and genetics is an essential part of the programme, as many of the new pasture legumes and grasses need adaptation to

the environment by genetical means. Legumes receiving attention include *Leucaena glauca, Indigofera spicata, Phaseolus* spp., lucerne and soya beans. In *L. glauca,* types are being selected with a multiple branching habit, high yield and frost tolerance. In lucerne the creeping rooted habit is being transferred to the common Hunter River type, and this will ensure that lucerne stands will resist grazing and remain vigorous for longer periods than at present.

Most strains of *I. spicata* are toxic, and efforts are being made to breed a non-toxic strain. The genetics of yield is being studied in soya beans with the aim of breeding strains better adapted to black soils.

In the grasses, most of the genetical work is being aimed at the adaptation of *S. almum* to a latitudinal range of 700 miles from north to south in the brigalow zone.

Work With Tropical Legumes

Dr. Norris' work in legume bacteriology has shown quite clearly that the legumes as a group evolved in the tropics, and that tropical species quite often are very specific in their *Rhizobium* requirements.

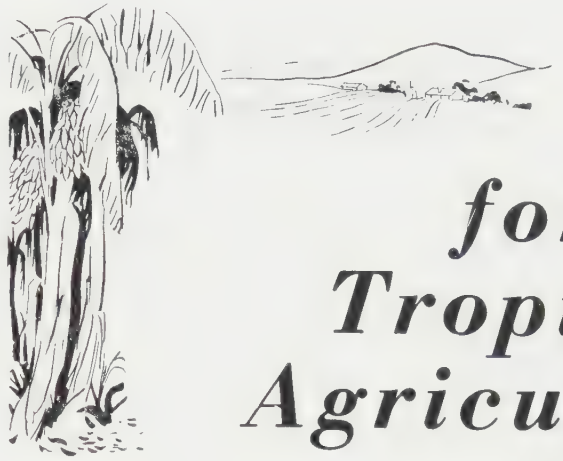
As stated earlier, one of the important findings in the plant nutritional work is the fact that most of the tropical legumes have a low calcium requirement. The distribution of ions within pasture plants is being followed qualitatively by means of radioactive tracer techniques, and the uptake of phosphorous is being studied intensively.

Most of the plant chemical work is concerned with the study of nitrogen compounds and nitrogen metabolism of promising sub-tropical legumes. Recently a plant physiology unit has been established, and work is in progress on characterising the promising grasses and legumes with respect to photoperiod, temperature, and humidity requirements.

It can be said that over the last decade, sufficient progress has been made to show that the pasture legume problems in the summer rainfall areas will be solved. As a result, a pasture revolution in the summer rainfall areas of Australia can be anticipated.

Fiji Pilot Salt-Making Project Shows Promise

First samples of salt obtained from a pilot salt-making plant at Savusavu, in Fiji, have been analysed at the Government laboratory, and the results are considered encouraging. The project resulted from a suggestion made in the report of the Burns Commission following its enquiry into Fiji's land and population problems. It was considered that the geothermal heat of the hot springs at Savusavu could possibly be used to evaporate sea-water to manufacture salt. To produce the 1,400 tons of salt consumed in Fiji each year, 50,000 tons of sea-water would have to be evaporated.



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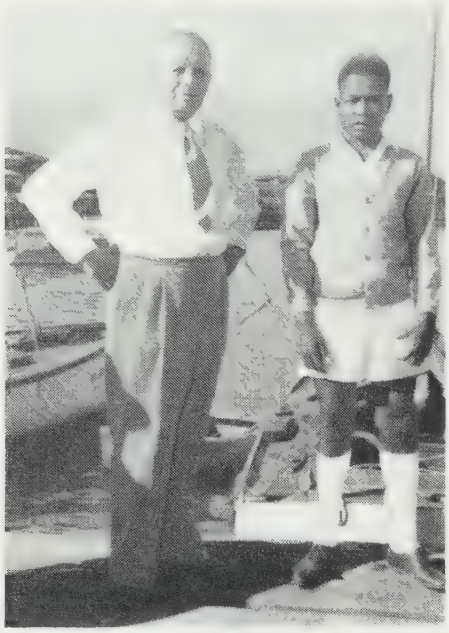
Fisheries Officer Retires From SPC Service

THE many friends throughout the South Pacific of Mr. Hubertus ("Bert") van Pel, South Pacific Commission fisheries officer, will be sorry to learn that he has been forced to resign on grounds of ill health. With Mrs. van Pel he left Commission headquarters for Holland on June 16.



Mr. van Pel on the Noumea waterfront with Songat Amos of Papua, one of the trainees who attended the SPC-FAO Fisheries Training Course held in 1956-57.

Mr. van Pel took up the post of SPC fisheries officer in July 1954, his main duties being to encourage the adoption in the Pacific of more up-to-date methods in the catching, processing and marketing of fish. These were tasks which during his seven years of service with the Commission he carried out with conspicuous success. He was also largely responsible for introducing fish farming to the Pacific, and released fingerlings of the hardy, fast-multiplying *tilapia mossambica* in artificially-made ponds and lakes in many territories.

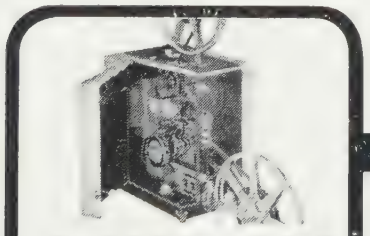
A practical fisherman—his early experience included six years as a North Sea trawler skipper—he was happiest when at sea determining fishing techniques, gear and craft best suited to local conditions and resources.

He also had a special interest in training young islanders as commercial fishermen, and felt strongly that they were urgently needed in nearly every territory of the South Pacific. He was director of the highly-successful SPC-FAO fisheries training course held in 1956-57 for 25 trainees from fourteen territories.

Mr. van Pel had the main responsibility for planning the SPC-FAO boatbuilding course now in progress at Auki in the British Solomon Islands, and the nine-week SPC-FAO fisheries training centre to open on August 23 at Tulagi, in the Solomons. Twenty-four islanders from six territories are taking the first course, and twenty-five trainees from four territories, the second.

Mr. van Pel developed the basic design of the 25′ fishing cutter, of which three are being built at the boatbuilding school for the fisheries training centre.

During his service with the Commission Mr. van Pel visited every territory in the South Pacific to study its fishing problems, and make recommendations for the development of its fisheries. Administrations generally found his reports most valuable, and several have adopted them as blueprints for establishing their own fishing enterprises.



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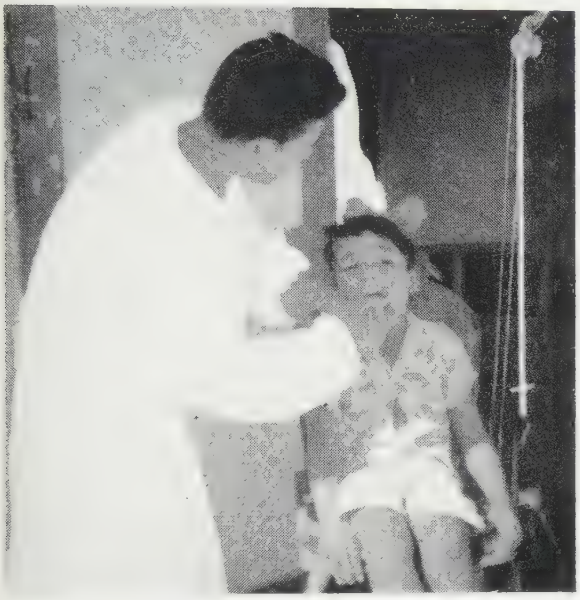
A Milestone In Trust Territory Dental Progress



Above: Children in Laura Village wait their turn to have their teeth examined. Left: Masuo Chile, a senior student at the School of Dental Hygiene, examines a young patient.

To overcome the problem of a real and growing shortage of dentists in the United States Trust Territory of the Pacific Islands, in September 1959 the Dental Department there opened a school of dental hygiene to train auxiliary dental personnel. How it functions is described in the article below.

By A. A. JAFFE*

PRIOR to September, 1959, the Dental Department of the United States Trust Territory of the Pacific Islands was faced with what appeared to be an insoluble dilemma. How could we, with our very limited staff, meet the ever-increasing demand for dental service from an expanding population? Since the ratio of dentists to our population is about half that in the States, and this difference is further magnified by our unique problems of distance and transportation from one district to another, it was imperative that a solution be found.

The obvious answer—training more dentists—is an impractical one, as we are limited by many factors. A minimum of three years academic study is necessary, while the number of students available is limited.

School Of Dental Hygiene

A better answer was our School of Dental Hygiene, which was opened in Majuro, Marshall Islands, in September, 1959, and inaugurated its first two-year programme. Its faculty is made up of four dentists and three physicians. Dr. H. E. Macdonald, Director of Public Health, is Honorary Director.

The School's primary function is to train auxiliary dental personnel, largely in preventative dentistry, thereby reducing the patient load on the dentists and enabling the latter to devote more time to reparative service.

The duties of a dental hygienist include the cleaning of teeth, the removal of calculus, cleaning of mouths prior to treatment by the dentist, application of fluorides and other prophylactic aids. In addition, he gives individual and group instruction in oral hygiene, with special emphasis on nutrition, to people of his district as well as to specific groups such as prospective mothers. Primary examination of school children's teeth to determine the need for possible attention by the dentist is also part of his job.

The School of Dental Hygiene is housed in a new building. The course consists of a junior and senior year, each of nine months' duration.

The curriculum compares favourably with that of any States school. Some of the subjects studied are histology, parasitology, biology, oral bacteriology, physics, chemistry, oral hygiene, nutrition, embryology, radiology, pediodontia, physiology, oral pathology, dental anatomy, materia medica, public health dentistry, periodontia, and sterilization.

In addition, the School is fortunately located near a school attended by three hundred children, so that practical clinical experience is readily available. The three-chair district dental clinic is utilized for this purpose.

During the last half of the senior year, field work using portable equipment as employed in the United States Armed Forces will also be carried out.

Selection of Students

The first-year class consisted of one student from each District (Marshalls, Ponape, Truk, Palau, Yap, Rota). Our target is the placement of two to five graduates in each District.

The students were chosen on the basis of recommendation by educational personnel and approval of District administrators. Minimum entrance requirements include graduation from an intermediate school and ability to read, speak, and understand the English language.

Students are furnished, free of charge, with all housing and subsistence needs including well-balanced meals, linen, laundry facilities, soap, etc. School sup-

(continued on page 72)

* Dr. Jaffe is Director of Dental Services, United States Trust Territory of the Pacific Islands.

Women's Clubs In Netherlands New Guinea

A sewing class. In Kelapa Lima the social worker runs sewing classes for mothers and single girls.

The following account of the widespread development of women's work in Netherlands New Guinea was prepared by the Commission's women's interests officer after spending three weeks in the northern town of Manokwari, where she met with local Dutch and Papuan leaders of the nine women's clubs. She also conducted a two-week course for Papuan and Dutch leaders representing the clubs of Hollandia, Sorong and Merauke.

By MARJORIE STEWART

SINCE World War II, the Papuan people of Netherlands New Guinea have with increasing eagerness taken part in activities designed to promote their own development—the women no less than the men.

For example, when a mission nurse started a six weeks' course for pregnant women, followed by a sewing course for baby's needs, hundreds of women in Hollandia asked for membership in the club that was formed. Today they still hold their weekly meetings, the programme having been expanded to include lessons in homecraft, food preparation, child care and upbringing. Each year culminates in Christian Family Day in which whole families celebrate—today a total of 750 persons.

The type of organization is much the same in each centre. When someone starts a club—sometimes assisted by a Papuan pastor's wife—the members ask for lessons in sewing, knitting, crochet and embroidery. After the women are skilled in making clothes, lessons are given on using a sewing machine and paper patterns. In places where the Papuan leaders are not yet able to give instruction, the club committee of Dutch leaders asks a nurse to give lessons in health and child care, or the Agricultural Assistant to talk about the growing of better food.

17 Clubs In Hollandia In 1960

In Hollandia in 1960 the clubs numbered 17, with about 375 members. The Dutch and Papuan leaders meet regularly to talk things over. The leaders are volunteer housewives, nurses and teachers working in co-operation with the Evangelical Christian Church and the Christian Labour Association.

In 1957 the Church appointed a woman social worker, partly subsidised by the Government. She began her duties in Hollandia, and among other things is adviser to women's clubs. She buys material which she retails to club members, helps with the programme, and sends suggestions and kit to clubs outside Hollandia, such as lessons and pictures for the flannelgraph board.

In all the larger centres of Netherlands New Guinea—in Biak, Sentani, Serui, Manokwari, Sorong, Teminabuan, Sarmi, Nimboran area, Kambuaja, Fakfak, Ransiki, etc.—these clubs have arisen, with hundreds of members.

Leadership Training

One of the first things the social worker saw as her task was the training of native leaders. Two Papuan girls have assisted her for some years, and are now able to lead the clubs themselves as well as teach. An important feature in training future leaders is the encouragement of educated girls to practice leadership while they are still at school. In the Nimboran area, the elder pupils of the boarding school for native girls learn how to run clubs in the surrounding area of Genjem, going out weekly two by two.

One very important activity last year was the training course given by qualified teachers to Papuan leaders and promising club members, including theoretical instruction and practical lessons in cooking, child care, health education, club and money administration, as well as the responsibility of the housewife for her family and for the club. At the close they organized a celebration.

Each pupil received stencilled lessons, of which many were broadcast and some printed in *Triton*, a monthly magazine. Most of these women were afterwards elected as a committee by the club members to formulate plans.

The wife of a native minister at Sentani Lake receives each week the teachers' wives of the neighbourhood. They come by canoe in the afternoon, sleep at the manse, and early in the morning begin taking the practical lessons which they will use in the village to teach the rest. Other places have asked for training courses.

Next year, in a house not far from Hollandia, the newly-arrived youth leader will start a new residential course for a group of young unmarried girls. It will concentrate on leadership training, and will probably last for a year.

Homecraft Courses For Single Women

For the young unmarried women a committee appointed by the mission schools organized a homecraft course of forty lessons in sewing, cooking and child care, which was accepted enthusiastically and three times repeated.

One girl who received her certificate at the end of the first course came back for the next, and in spite of being told

A cooking lesson—part of a homecraft course which also includes sewing and child care.

that she would cover the same ground, insisted on staying. Finally she said that she must go back to her village to organize women's clubs. After six months there she returned to the social worker saying they had formed a club, and that they wanted her to visit them as they needed more ideas for their programme. They carried her baggage and after eight hours of walking and two in a canoe, the social worker arrived and found the group awaiting her.

Two days of intensive teaching followed. She stayed three nights with the girl leader. It was a fine village, and many homes had vegetable gardens. The leader, who had formerly been doing odd jobs in a printery, now lived in the village, doing the customary women's work and teaching in the club, where her certificate is accepted by the older women as a guarantee of her ability.

Celebration During Christian Festivals

At the Christian festivals of Christmas, Easter and Pentecost the clubs get together and celebrate with choir and drama. On one such occasion they held a fashion show, which illustrated the skill of members.

Husbands who had protested against clubs as a waste of time attended the celebrations and took part in a public speaking contest, the topic being "Good and Bad Features of Women's Clubs." The men spoke with enthusiasm only of the good points, and acclaimed the clubs as fine and helpful institutions, doing untold good. All the speakers received prizes!

Clubs In Main Centres

In the town of Manokwari there are nine women's clubs, with about 250 members. They are headed by a board of five, the chairman, secretary and one other member being Papuan. The name of the organization is *Kaum Wanita Kristen* (Christian Women's Clubs). The Malay word *Keruhatang* says that every mother, in order to run her house and family, must think, must use her hands, and must give the love of her heart to its members. The members are all from the Evangelical Christian Church of New Guinea. Most are mothers but there are also girls, their ages varying from 12 to 50.

All clubs have three Papuan leaders. The first opens and closes the meeting, reading a chapter from the Bible and leading in prayer and singing. Of the other two leaders, one collects the subscriptions which she hands to the Treasurer of the Board, and the other buys the material and sees that the members pay for what they use.

Each club has one or two Dutch instructors for the practical skills; together they run a training course for Papuan leaders once a month, when they discuss the next month's programme. Festal gatherings held in church before each Christian festival are conducted by the Papuan leaders.

Once a year there is a Family Day. In the morning the houses are visited to see if all is in good order. In the afternoon the children are entertained with games, songs and sweets. The evening is for wives and husbands, and a programme is given concerned with family life.

In 1960 they received a Government subsidy to buy a sewing machine and materials. In the bigger villages outside Manokwari there are five clubs which are helped with materials.

After five years of this work the women are better clothed, they prepare better food, their homes are cleaner, and some have flower gardens where formerly there were only vegetables and sweet potatoes. Unfortunately *Adat* (custom) sometimes forbids the women to carry out at home what they have learned at the club, or often there is not enough money because too much goes on dowries. Progress may at times be slow, but the results are there.

Four Clubs In Sorong

There are four women's clubs in the oil town of Sorong, each with thirty members who pay a small subscription. Each year there is a subsidy from the Government.

Each club has two Melanesian and two European leaders, one being a member of the leaders' committee which meets monthly. Last year there was a weekly training course for Melanesian leaders over a period of three months, culminating in a festival run by the leaders. The women of Sorong want to do little else except sewing, but once a month there are classes in other subjects — cooking, child care, flower arrangement, etc.

In Biak there are seven clubs with an approximate membership of 225 and nine Dutch and six Papuan leaders; they follow the same practical programme.

Progress In Kelapa Lima Village

The Roman Catholic social worker in Merauke describes the development of women's work in the village of Kelapa Lima, in the low-lying area of the south. The village has almost 2,000 inhabitants. Of the 1,500 natives, some have come from the mountains while others are river people. Some 500 are *budjans*, or bachelors, living in quarters built of cement with zinc roofs. Most of the family houses are very primitive, with soil floors and leaves of the sago palm for roof and walls. Each has a garden in addition to the usual rice plot.

The area is not very healthy. Swamps breed mosquitoes, and there are many cases of malaria. The long, dry season causes severe water shortage when many of the wells are dry, while in the rainy season there is too much water and consequent flooding. Many of the people have low resistance to tuberculosis, as they come from mountains where there was an inadequate food supply.

Two years ago the Roman Catholic Mission appointed a woman social worker for the area. She preferred to live in Kelapa Lima among the Papuans. There she started by investigating why

(continued on page 63)

A consignment of mature green ginger grown at Dobuilevu Experimental Farm, N.E. Viti Levu, awaiting shipment to Vancouver. A sample is being examined by the author.

Processing And Marketing Ginger Products

Today, ginger is extensively used in cooking and to flavour soft drinks, while it also has medicinal applications. This article describes the cultivation, processing and marketing of ginger and its products.

By V. E. SILLS*

GINGER is one of the earliest known spices, having been mentioned in ancient Chinese and Indian literature. It was introduced into the West Indies and Mexico by the Spaniards in the 16th century, since when Jamaica ginger has come to be regarded as the finest produced; other varieties from India and Africa are more pungent and less pleasantly aromatic in taste.

Commercial ginger is prepared from the underground tuberous stem or rhizone of *Zingiber officinale* Roscoe. It appears mainly in two forms—as a hard, peeled, dried product, possessing much fibre and pungency, and as the popular preserved ginger in syrup prepared from young, tender, succulent rhizomes, free of fibre and of mild pungency. The young, tender rhizomes are also marketed as "ginger in brine" but most of this eventually becomes the raw material for preserved ginger in syrup—after the salt has been removed by boiling in water; it is also used directly in the manufacture of sauces and pickles. Yet another version is the familiar sweetmeat "crystallized ginger", the result of taking the ginger-in-syrup process a stage further.

Sources And Trade

Practically all the dried ginger entering the world's markets is produced within the Commonwealth, Jamaica, India, Sierra Leone and Nigeria being the principal sources. On the other hand, virtually all the preserved ginger entering world trade comes from Hong Kong, having been grown largely in the moist, rich alluvial flats of the Canton delta.

Annual trade figures show that 5,000 tons of dried ginger were exported from Commonwealth countries in 1954 and that slightly under 3,000 tons of preserved ginger valued at £432,000 were exported from Hong Kong in the same year. The price of dried ginger has fluctuated widely in recent years: towards the end of 1953 Jamaica ginger sold at 105/- per cwt., but at the end of 1955 had rocketed to 450/- per cwt.; towards the end of 1958 Jamaica grades were offered at 280/- per cwt. By way of contrast, Nigerian peeled ginger was offered at 210/- (spot) and split ginger at 95/- per cwt. (late 1958).

Types Of Dried Ginger

The following information on the various types of dried ginger met with in commerce has been provided by the Tropical Products Institute:

Ginger from Jamaica by virtue of its delicate odour and flavour is considered to be better than any other variety. It is "clean" peeled and is marketed in three grades, bold, medium or No. 2, and small or No. 3; the bold consists of large, firm, unwrinkled hands, of pale uniform colour, free from mildew. This high-grade ginger is in good demand for the grocery trade for sale unground; it is also used for distillation.

Sierra Leone ginger, which is coated (unpeeled), cannot be used for the grocery trade. Its flavour is somewhat camphoraceous but it is more pungent and contains more essential oil than other types, and for this reason is much in demand for the extraction of oleoresin (gingerine) and for distillation.

Nigerian ginger resembles the Jamaican but is of lower quality. It is peeled but not quite as cleanly as the Jamaican; the producers often prefer to break the hands as this simplifies the process of peeling, but this grade, known as "splits", is of much lower market value.

Indian ginger is of two types—Cochin and Calicut, according to the district in which it is produced. It is sometimes coated but is usually "rough peeled" or scraped on the flattened sides of the rhizomes; clean peeling is not practised in India. Indian gingers are much used for blending; they have a distinct lemon-like odour and flavour, more pronounced in the Calicut spice, and are preferred by manufacturers of ginger beer.

Method Of Cultivation

As already mentioned, preserved ginger is derived from young, tender rhizomes; the age at harvesting is around 4 to 6 months, the optimum period depending on the month of planting. The succulence and slight pungency characteristic of Chinese ginger appear to be due to the special methods of cultivation

* Biochemist, Department of Agriculture, Fiji. This article is reproduced with acknowledgements to the Department's *Agricultural Journal*.

Above: Ginger plant as harvested, showing rhizomes, inflorescences and leaves. Right: Close-up of rhizomes.

and not to differences in variety as was once supposed. This type of ginger is best produced on a well-drained, rich, vegetable loam, and in Canton is often grown in rotation with rice, being given heavy dressings of liquid manure.

Jamaica ginger, on the other hand, requires rather different growing conditions. According to the *Farmers' Guide* (1954) it does best on a deep loamy soil overlying white or yellow limestone; stiff clays and sandy or gravelly soils are to be avoided; and in order to produce straight, undeformed rhizomes—which are the most valuable—the plant should be grown in a loose friable soil, one that offers little mechanical resistance to the development of the underground fleshy parts. Since this type of ginger is intended to be dried it is left in the ground until fully mature—9 to 12 months from the time of planting.

In Jamaica yields are of the order of 1,000 to 1,500 pounds per acre. (For fuller information on ginger in Jamaica, see article by Prentice, *World Crops*, January 1959.)

Method Of Curing

Dried ginger is comparatively simple to prepare, but a certain amount of skill is called for on the part of the operator, especially during peeling.

On a peasant scale the first operation is to remove loosely adhering earth from the freshly dug rhizomes and to put them to soak in water overnight. The cleaned "hands" are then carefully scraped, or peeled, with the aid of a special knife—an operation both arduous and time-consuming. It is claimed that a good worker can "clean" peel no more than 10 to 14 pounds of rhizomes per day. At this rate it is clear that, to make the business profitable, cheap labour is essential. In an attempt to find an alternative to hand peeling certain commercial undertakings have tried using machines fitted with abrasive rollers, such as are used for peeling potatoes, but appear to have met with little success. Ginger hands are an awkward shape for a machine to deal with, particularly as only a thin outer layer of skin is required to be removed. Rough or clumsy peeling lowers the value of ginger appreciably because most of the oil-bearing cells are located close to the surface just beneath the thin corky outer layer (0.4 mm. thick) and consequently unless care is taken much valuable oil is lost in the peelings.

After peeling, the hands are again washed in clean water and allowed to soak overnight. It is said that the more thoroughly this washing operation is done the whiter the finished product. The hands are then dried in the sun on a clean surface, e.g., cement, with frequent turning. Sun drying takes 6 to 8 days, so regular turning is necessary to ensure even drying and to prevent the growth of moulds on the moist underparts. If, at this juncture, the ginger is not considered sufficiently white in appearance, it may be bleached by further washing and drying in the sun.

Alternatively, ginger is sometimes parboiled in water, or in water containing lime juice, before peeling. This process gives rise to the "black" ginger of commerce.

In some parts of India ginger is "limed" by dusting with calcium sulphate or carbonate, giving the spice a whitish appearance. The purpose of liming is to make the ginger less susceptible to the attacks of insect pests, although, since this dust is objectionable in foodstuffs, it must be regarded as a form of adulteration and therefore the practice has little to commend it.

Ginger In Fiji

Judging from the results of drying experiments performed in the laboratory and of recent trials carried out in the field the type of ginger at present being grown in Fiji appears to be unsuitable for the production of commercial dried ginger. Local ginger is, however, excellent for marketing as "green ginger" and may be exported either fresh or preserved in brine. Until 1954, after which exports of ginger from Fiji ceased, regular quantities of green ginger were shipped to New Zealand, the amount in 1954 being 26 tons valued at about £1,000.

During 1958 two tons of rhizomes were harvested at the District Farm, Ra, and transported to the Principal Agricultural Station, Koronivia, for curing. The ginger was washed, peeled by hand and dried on a grain drier. During this operation the Department was left in no doubt as to the impracticability of peeling ginger by means of paid labour, and even drying costs proved high. The final yield of dried ginger was five hundredweights, indicating a drying ratio of eight parts fresh material to one part dry, which compares unfavourably with that obtained in Jamaica, where, it is claimed, four tons of freshly lifted rhizomes produce 1 ton of dried ginger. No doubt the reason for this poor yield can be attributed to differences in local soil conditions and methods of cultivation, with varietal differences playing a minor role.

On the other hand, dried ginger prepared from local material is not found lacking in pungency; comments on samples sent to overseas buyers have been encouraging.

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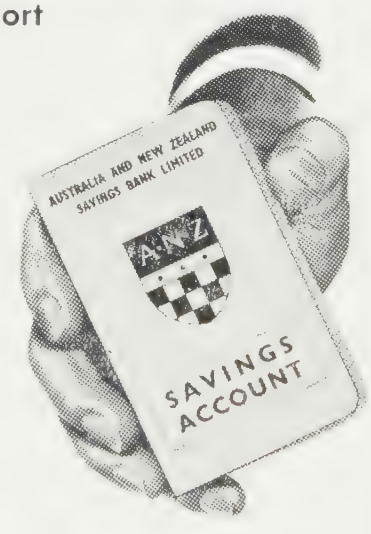

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Reference may be made here to "black" ginger, prepared by dipping fresh rhizomes in boiling water before peeling, washing, etc. A laboratory prepared sample showed that the boiling water treatment did not make the peeling operation any easier, while it gave the product a most unattractive colour, being both dark and uneven in intensity.

Preserved Ginger

According to Brown (1955) the process used in Hong Kong for preserving ginger is performed as follows: First, clean, peeled ginger is boiled in water for a few minutes and, when cool, is removed and pricked with a fork. The purpose of pricking is to facilitate the entry of sugar during subsequent boiling in syrup. The ginger is then boiled for 45 minutes in syrup prepared by adding eight parts by weight of sugar to ten parts of ginger and sufficient water to cover. It is left in the syrup to soak for two days or more and is then reboiled, after which it is packed in fresh syrup.

To prepare dry or crystallized ginger the process of boiling in syrup is continued a stage further—in stronger syrup. After soaking in the heavy syrup the sugar-saturated product is removed, drained, dried, mixed with sugar and finally packed in heavily soldered tins.

Fiji-grown ginger can be preserved in syrup or crystallized with sugar quite successfully, providing care is taken to select suitable young, well-shaped hands. However, the finished product appears to be rather too "hot" to please the average domestic consumer, from which the conclusion may be drawn that it would be advisable to experiment first with different varieties of ginger and methods of cultivation before going in for a commercial venture of this sort.

Constituents Of Ginger (Dried)

Ginger contains from 0.25 to 3.0 per cent. of a volatile oil possessing the characteristic aroma but not the pungency of the spice, the latter property being due to the presence of gingerol. Gingerol is an odourless, yellowish-coloured, fixed oil characterized by an intensely pungent taste; together with resin these constituents account for 3 to 4 per cent of the total weight.

In addition, ginger contains 50 per cent or more of starch and an average of 4 per cent of crude fibre, the limits being 1.7 to 9.0 per cent.

Oleo-resin or ginger oil is a commercial product, being an organic solvent extract of dried ginger. The present London spot price is 160/- per lb.

Uses Of Ginger

Ginger is today extensively used in culinary preparations such as soups, puddings, pickles, gingerbread and so on, and is an ingredient of some curry powders. It is a popular flavouring in beverages such as ginger ale and ginger

beer. In medicine it finds use as a carminative and digestive stimulant.

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* *

EDITOR'S NOTE: The author has supplied the following comment on developments in the production and marketing of ginger products since the above article was published in the Fiji Department of Agriculture's *Agricultural Journal* for March 1959.

AUTHOR'S SUPPLEMENTARY NOTE: Since this article was written, no important changes or developments appear to have occurred in the production and marketing of ginger products. It is perhaps worth recording, however, that the market price of dried ginger has continued to fluctuate widely. The reason for this is not hard to find. In common with some other minor crops, for example, pepper, nutmegs, etc., ginger tends to be overproduced during a period of relatively high prices; this is followed by a period of low prices which inevitably leads to under-production, the effect of which is to maintain a strong cycle of high and low prices. Consequently, there are times when the grower, particularly the small holder, suffers severe hardship, for the price he receives for his ginger sometimes fails to cover the cost of production.

During 1956-57 the price of Jamaica No. 3 grade dried ginger was relatively high—500/- to 600/- per cwt.—but was down to 182/- towards the end of 1959; early in 1961 it was quoted at 200/-. African ginger has also been affected in a similar way, although not quite to the same extent.

Teacher Training College For New Hebrides

In the New Hebrides, a British Central Teacher Training College is to be established at Malapoa, near Port Vila. Buildings will include four lecture rooms, a large assembly-dining hall, common rooms, library, administrative offices and full residential facilities for a total of up to sixty-four men and twelve women students and for a staff of five.

Selected students will follow a two-year training course, including further instruction in English. Schools near Vila will provide opportunities for teaching practice. Students completing the course will take up teaching posts in village schools in all parts of the Group.

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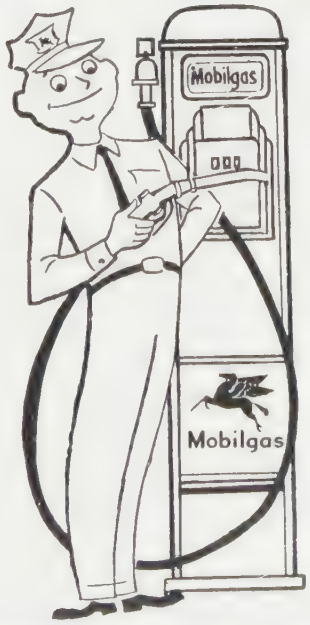

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Rural Progress Through Village Clubs

(continued from page 42)

time to time for day refresher courses in club procedure and programme.

Sawani Boys' And Men's Club

When the immediate effects of the formation of the Waimanu Girls' Club was appreciated by the men, they offered a "tabua" (whale's tooth) to the principal of the school to open a similar club for village boys who, they admitted, were completely out of hand. As a result the Sawani Boys' and Men's Club was formed in September, 1960.

A survey revealed the following needs:

(i) Activities, profitable or recreational, to give the boys and men something to do;

(ii) improvement in the living conditions of the village;

(iii) practical co-operation on the men's part to enable the women's Club to function successfully. (For example, a large herd of communal cattle has been straying through the village, trampling it into swamp and destroying freshly-planted gardens).

The resources of the Adi Cakobau School for assisting this type of club were promising. The farm overseer volunteered to teach fencing, draining, pasture improvement and road making. The carpenter was prepared to teach carpentry and to superintend simple building projects. The dairyman was an athlete, and the dynamo operator was keen to assist a gifted local musician in forming a choir.

A survey of probable membership resulted in a list which included not only youths but also the middle-aged and the elderly. Both the *Turaga ni Koro* and the local chief decided to join, and because it was felt that a successful club must work with, rather than against, traditional organization, it was decided to leave age grouping for the future and to accept all male members of the village desiring to join. An interim executive of equal numbers of Adi Cakobau School staff and of representative villagers was formed. Both the *Turaga ni Koro* and the local chief were included, so that the Club activities could be dovetailed with communal work.

Recently village representation has been increased by the addition of a number of younger men, including leaders of the four working teams in the Club. One or two young men who have displayed initiative in such projects as building their own homes, or becoming key personnel in industry, have been co-opted. Their vitality is invaluable in stimulating the more conservative villagers into action.

The headmaster of the village school is proving his value as a liaison between groups and in the integration of activities.

Executive meetings are held once a month; Club meetings are held in the village on Mondays and Fridays between 4.30 and 6.30 p.m. The failure of the rural villager to appreciate time means that many come too late to make best use of the gifted leadership of the resource personnel, whose hours are limited.

Achievements to date have been:

(i) The fencing of four large fields with hardwood posts and barbed wire to prevent the fifty odd head of cattle from straying into the compound.

(ii) Draining of the numerous swampy areas of the village.

(iii) Construction of raised paths in housing areas and a number of good well-drained access paths to the river for those drawing water.

(iv) Construction of three hundred yards of eight-feet wide road, with the necessary culverts, to provide better access to the village.

(v) Formation of a male choir.

(vi) Improvement of athletic standards and preparation of members to take part in Suva competitions under the Club's banner.

(vii) The purchase of two footballs.

Plans for 1961 include:

(i) Re-roofing of a number of bures with new iron, the hardwood rafters to be cut from the bush and milled.

(ii) Construction of one model house of more permanent local material as a pilot project for a village building scheme.

(iii) Beautification of the village by means of ornamental trees and shrubs.

(iv) The repairing and repainting of the dilapidated school which serves the three villages.

(v) Formation of the Waimanu Football Club for competition in Suva.

In many ways this Club has been the most difficult of all to run. Fijian villagers at this stage of their development find heavy responsibility almost unbearable, and consequently need someone with whom to discuss their problems —they need to seek advice in making long-term plans, in obtaining necessary materials, in the co-ordination of activities and in the care of club funds. The Fijian members of the school farm staff have put in many extra hours of work, but so far have found the small triumphs more than outweigh the inevitable disappointments.

The oldest of these school extension clubs is only nine months old, the youngest six. It is too early to judge whether they will survive the many trials and tribulations that beset clubs of this sort after that "first fine careless rapture" departs. We can only hope, persevere, and continue to learn from experience.

Women's Clubs For Netherlands New Guinea

(continued from page 57)

the women wanted clubs. She heard that they all liked embroidery, so the club began with twenty mothers. After each embroidery lesson the worker was able to give a short talk about health, and how to clean a house. Gradually the embroidery lesson was replaced by sewing lessons. Now there are three sewing classes for the mothers, one for unmarried girls and one embroidery class for girls of from 10 to 12 years.

The next step was to choose four promising women and give them training in leadership and the wider purpose of club membership. After five sessions of instruction and discussion they were very enthusiastic, and asked all the women of the village to come to the parish centre.

On the first occasion 55 turned up, but attendance became irregular and the children were so noisy that it was impossible to conduct a meeting. So after consultation with the leaders, small local clubs of 15 or 20 women were formed, each of one tribe. Now there are seven well-attended clubs in the village, meeting once a month, when instruction is given concerning community and family needs. They choose their own leaders. In addition, classes in practical subjects are held every week for those who want to learn. The Agricultural Assistant has been most helpful over the vegetable and flower gardens, providing both seeds and instruction with excellent results.

An Encouraging Story

The success of all these women's clubs is an encouraging story of volunteer enterprise and willing regular service on the part of both Dutch and Papuan leaders. The repeated efforts to promote leadership training classes or courses gives promise of increasing independence in club organization. Gradually the limited interest in sewing—a natural economic concern—is being expanded in a few areas to a new sense of responsibility for the life of the community and a growing realization of the contribution that can be made by the mother of the family.

The Government is taking an increasing interest in the work as it appreciates the value of adult education in all its many practical forms. The time is ripe for a swift expansion of the pioneer work which has, with limited resources, produced such promising results.

SPC Co-operatives Officer To Help Run Seminar At Koror

On July 7 the Commission's co-operatives officer, Mr. R. H. Boyan, will leave headquarters for Guam en route to Koror, on Palau Island, in the United States Trust Territory of the Pacific Islands. There he will assist in running a seminar on co-operative principles and practices, with special emphasis on credit union organization.

Mr. Boyan will spend a week of his journey each way at Guam, where with officers of the Department of Agriculture he will study the progress being made by the Guam Agricultural Producers Co-operatives Association, which he helped to set up in 1959. Its main purpose is to assist farmers to exploit fully the large local market available for fruit, vegetables and eggs.

Co-operatives Flourishing In The Cooks

Co-operative societies in the Cook Islands continue to flourish. During the year ended September 30 last 14 new societies were registered, bringing the number of all societies to 59. Total membership increased by 1,603 to 5,728, savings from £19,093 to £34,790, and assets by some £10,000 to over £41,300. Despite the drop in price of copra, co-operatives still marketed some £10,300 of produce; they also had a very substantial turnover in purchases of household and other goods needed by members.

A total of 402 loans were issued by co-operative societies to their members, for a variety of purposes. Apart from agricultural loans, house-building was the most important loan activity. The total effort of all co-operatives was 27 houses built and 28 repaired, with another loan indirectly connected with housing.

SPC Handbook For Women's Clubs

The Commission's women's interests officer, Miss Marjorie Stewart, has just prepared a small handbook* for the guidance of office bearers in women's clubs and similar organisations.

Entitled *Handbook for Women's Clubs and Organizations,* it covers such topics as The Club Programme (planning meetings, talks and other activities); Office Bearers (president, secretary, treasurer, activity leaders and the committee and their duties to the club); Elections (nomination of members, method of voting, and choosing office bearers); and Committee and Business Meetings. The final chapter explains the meaning of club membership in the form of a series of questions and answers, and is intended to be read aloud from time to time to club members.

* Obtainable from the Commission's Literature Bureau, Box 5254, G.P.O., Sydney. Price A.1/- per copy plus postage.

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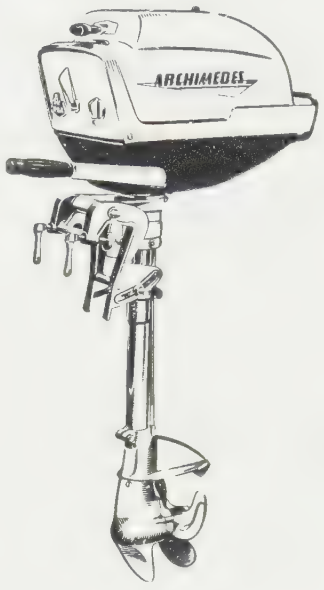

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PACIFIC READING

Material in this section is contributed by the South Pacific Commission Literature Bureau. Any enquiries relating thereto should be directed to BOX 5254, G.P.O., SYDNEY, AUSTRALIA.

Bureau Publications

PETER AND SEIVA. Readers may remember that in 1959 the Bureau published experimentally a "novel" entitled *Peter and Seiva*. From an examination of library borrowings in the islands we had noticed that many young people were looking for light modern fiction. Although publishers are today putting out editions of excellent modern fiction at a price which island libraries can afford, there is still a gap in the fiction available in the islands. None of the existing material seems to have a Pacific Island setting in which the circumstances, sentiment, and actions are seen through the eyes of the islanders themselves. A great deal of the material is too far removed from island life, and too advanced in story construction and language, for the largest group of readers, i.e. those with a fair but by no means one hundred per cent command of English; and nearly all of it is too expensive for individual island pockets.

In *Peter and Seiva* we sought an answer to these problems. It was quite well received, and some 4,000 copies (including some good school orders) were sold. There are still a few hundred copies left (price A.3/- per copy or 2/- per copy for 12 or more).

The Literature Bureau is now going to press with a sequel, *Peter Returns to Seiva*. While the story has a Polynesian setting, reports from Melanesia say that the first book was understood and warmly appreciated there.

Everyone we meet in the islands says there is need for more reading material written in the context of the islanders' own lives. But writing and publishing such material is not the main problem; the main problem is getting it into the hands of island readers. Bookstores and libraries are too few and far between. We therefore appeal to readers of these columns to help by purchasing a few copies for gift or resale to their island friends. How else can island readers get hold of reading matter when there are few or no bookshops? How else can we find out what people really do want? And if some teachers feel there is a need to lighten the school diet of the *Clean Up Your Village* and *Be Thrifty* type of reading matter — here's the very thing. The author of the Peter and Sieva books, Wiriamu Aretoa, has spent many years in the islands working with young people.

Orders should be sent to the Literature Bureau, Box 5254, G.P.O., Sydney.

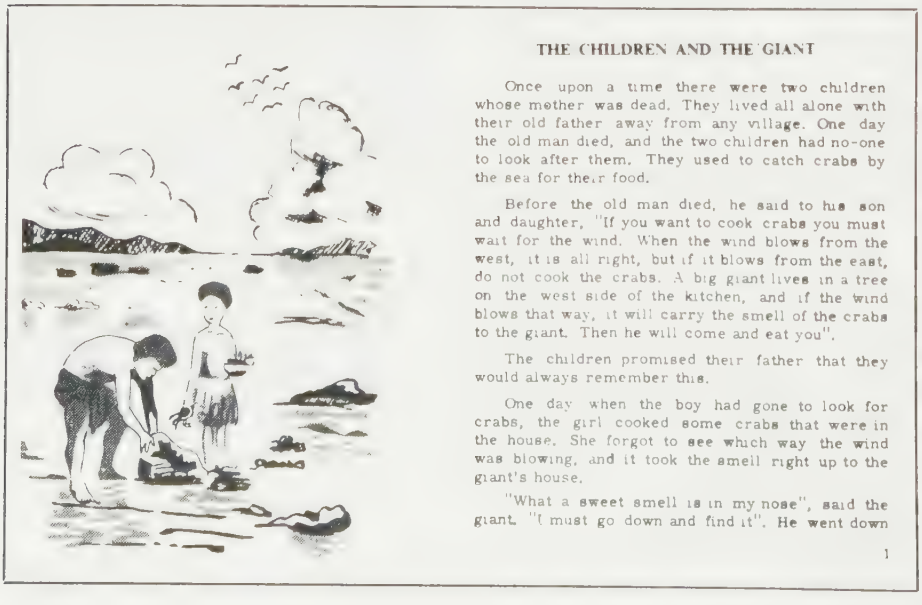
PAPUA AND NEW GUINEA IN PICTURES. A reprint of this book, originally sponsored by the Literature Bureau, has now been published by MacMillan & Co. Published price is A.6/6. While the book is widely used in schools for elementary social studies on Papua and New Guinea, it is also an attractive picture record of that country as it contains, within its 95 pages, forty-four 6½" x 4¾" photographic illustrations. Obtainable from bookshops.

Honiara Publications

Two interesting productions come from the Commission's training Centre in Honiara where young men from Pacific Islands are undergoing a course of training in literature production. They are:

JOURNEY THROUGH THE GROUND. This is a reprint of a collection of traditional legends from various islands in the Solomons Group, produced originally by the Education Department. The book has been set up and printed by the trainees at the Centre and illustrated in colour by two trainees, Tearaoa Ariki of the Cook Islands, and Samuel Irofufuli of the Solomons. The book contains 26 pages; is in English suitable for Standard 4 level; and is excellent value at 9d. per copy with 33 1/3% discount for 12 or more

Below: Two pages from "Journey Through The Ground", a collection of Solomon Islands legends. The book, which is illustrated in colour, was set up and printed at the Commission's Literature Production Training Centre at Honiara. Right: Cover of another book recently printed at the Centre.



THE CHILDREN AND THE GIANT

Once upon a time there were two children whose mother was dead. They lived all alone with their old father away from any village. One day the old man died, and the two children had no-one to look after them. They used to catch crabs by the sea for their food.

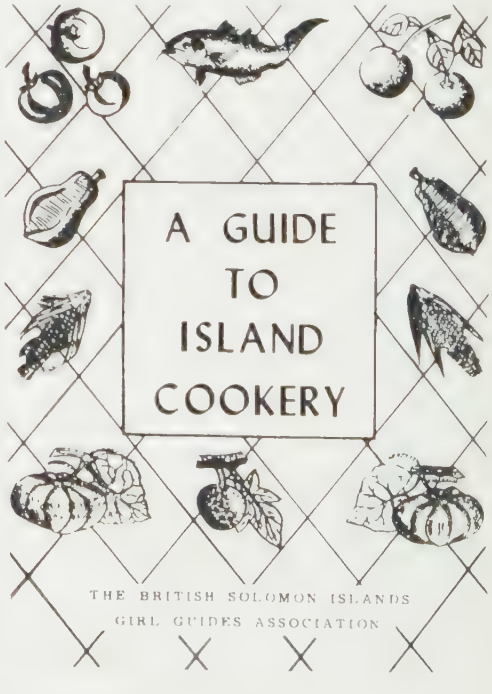
Before the old man died, he said to his son and daughter, "If you want to cook crabs you must wait for the wind. When the wind blows from the west, it is all right, but if it blows from the east, do not cook the crabs. A big giant lives in a tree on the west side of the kitchen, and if the wind blows that way, it will carry the smell of the crabs to the giant. Then he will come and eat you".

The children promised their father that they would always remember this.

One day when the boy had gone to look for crabs, the girl cooked some crabs that were in the house. She forgot to see which way the wind was blowing, and it took the smell right up to the giant's house.

"What a sweet smell is in my nose", said the giant. "I must go down and find it". He went down

1



copies. Orders should be sent to the Officer-in-Charge, South Pacific Commission Literature Production Training Centre, Box 134, Honiara, B.S.I.P.

A Guide To Island Cooking. This is a book of recipes collected in the Solomon Islands. The recipe for producing the book was as follows:

Take a Pacific island where fresh food consists mainly of tropical fruits and vegetables, and seafood (but not as much as you would think); and where most other things to eat come out of tins. Be sure to choose an island where the lonely exiles come from many different places, Britain, Australia, New Zealand, Holland, and others. (In this way you get a specially attractive flavour.) Get a committee (with an energetic Secretary) which is determined to raise some funds to help the island Girl Guides to build a new guide and brownie hut. Now stir them all into action to produce a cook-book. Get the trainees at the Commission's Literature Production Training Centre to cook up the results in an attractively-produced 56-page book, and wrap in a cover most effectively designed by a Solomon islander, Samuel Irofufuli. Serve at A.4/- a copy.

The result? Since most of the ingredients can be found at some season in Australia and certainly in other Pacific islands, a welcome addition to your Pacific island recipe collection (and, we hope, a new guide hut for the Solomon Islands girls). The book is available from the Education Department, Honiara, B.S.I.P.

Books About The Pacific

Fiji: Agriculture and Schools. For many years the Departments of Education and Agriculture in Fiji have given special attention to the development of sound agricultural training in schools. To be effective such work must not just consist of theoretical lessons in the classroom; practical work in good school gardens, and first-hand experience in handling poultry, pigs, cattle etc., are the real foundations of such work. In support of this, and to assist both teachers and students, the Department of Education in Fiji has issued a number of pamphlets prepared by Mr. R. L. Hartley who is in charge of school gardening work there.

Two volumes have been issued, and the titles of some of the pamphlets give an idea of their scope. Book 1 contains pamphlets such as "Planning of Production and Instruction in the School Garden," "Summarized Planting Information," "Poison for Plant Pests," "Maintenance of School Grounds during Holidays," and "Seed Production and Storage." Book 2 includes information about poultry, pigs, cattle, goats and horses etc. The pamphlets are very comprehensive, and are illustrated with many diagrams, drawings, and photographs. They have been bound in loose-leaf form; this is a great advantage in that new pamphlets can be added from time to time, while earlier ones can be replaced by revisions if and when necessary.

A small number of specimen copies is available for inspection from the Director of Education, Suva, Fiji.

The Cook Islands. The School Publications Branch, Department of Education, Wellington, has put out a new 36-page book about the Cook Islands. The book is intended primarily for children in New Zealand schools and aims to provide them with a picture of how people live in the Cook Islands. It refers to such topics as daily life, housing, languages, dress, occupations, recreation, and earning a living.

OXFORD BOOKS

ON ARITHMETIC

The following are some of the books published by Oxford University Press to help in the teaching of arithmetic to youngsters to whom English is a second language. They are all written by L. W. Downes, D. Paling and F. Smithies.

THE TEACHING OF ARITHMETIC IN TROPICAL PRIMARY SCHOOLS 15/-

This big book (500 pages) has a strictly practical aim: it is intended to show the many ways in which teachers may help children to learn arithmetic. It is hoped that it may also help teachers to get a better understanding of the subject, so that, in turn, children may understand better what they are taught.

TABLES 5/6

This helpful handbook embodies a suggested method of using interesting devices to present number facts and building up tables incorporating them.

THE OXFORD ARITHMETIC COURSE—NIGERIA

Book One 2/4
Book One Teacher's Notes 5/–

This gay course, printed throughout in two colours, begins with nine pages of pictures, each ten inches by seven. From counting and drawing the objects in these pictures (and suggested allied informal experiences of number), the Course takes children through the basic operations, using pictures and diagrams practically all the time. The *Teacher's Notes* is a 150-page book full of help for the teacher; it sets out the preparation necessary for each lesson, the aim of the lesson, and the methods of achieving it. Inspection copies are available at the address given below.

All prices are quoted in sterling currency.

OXFORD UNIVERSITY PRESS

346 LITTLE COLLINS STREET MELBOURNE

The book does not pretend to be a deep and comprehensive study; but it is factually accurate, up to date, and simply and attractively presented. The author, R. G. Crocombe, has worked in Government service in the Cook Islands and knows his material at first hand. There are a number of good half-tone illustrations.

For all these reasons this little book makes a welcome and useful addition to the materials available which can help people in other Pacific Islands gain information about the Cook Islands. It would be a happy thing if there were at least one such publication about each of the main island groups in the South Pacific. This book should certainly be in all school libraries.

PEOPLE IN THE SUN. Lyndon & Ronald Rose. Sydney; Angus & Robertson. A.30s. pp. 94. Illustrated.

To quote from one of the preliminary pages: "This book attempts to show, in pictures, what the native people of Australia and some of its island neighbours look like, how they dress, the sort of houses they live in, what they eat, how they normally occupy themselves, and what their prospects are for the future."

The book has large pages (11″ x 8½″) and on each page there are one or more photographs accompanied by quite a short text. However, the text is not merely a caption; it provides a most informative amplification of the matter illustrated. The text, intended for the general reader, is wholly commendable; sympathetic to its subject matter but without sentimentality; accurate and informative; and written in the most pellucid English.

These columns of PACIFIC READING are written for people who live in the Pacific Islands, who rarely have a chance of seeing a bookshop. It is thus necessary to make one or two comments for those who must risk their thirty shillings on the book "unseen." First, the book deals only with Papua and New Guinea and Samoa, and the Maoris of New Zealand. Obviously there is a severe limit to what can be accomplished in 94 pages, and so selection was necessary. One therefore hopes the reception of this book will encourage a second volume. Second, the book deals almost entirely with the more traditional aspects of island life. This again is probably dictated by the necessities of selection, but it could lead some readers outside the islands to overlook the very substantial modernization that is taking place today—for better or for worse! It is only fair to say that the authors recognize these limitations.

A more serious comment must be made about the illustrations. Although obviously excellent in original, they are disappointingly reproduced. Perhaps one has become so accustomed to the excellent half-tone in many modern illustrated books that the flat pictures here are disappointing; but even allowing for the comparative flatness of many lithographed illustrations they could surely have been less muddy.

Nevertheless, this book is a very worthwhile addition to material about the Pacific, and apart from personal reading should find a place in all school libraries.

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Miscellaneous

LANGUAGE TEACHING. The question of "how and when to introduce a second language" e.g. English or French, has always been a somewhat controversial one. The answer cannot always be stated in purely educational terms; the circumstances and feeling of the people concerned must also influence a decision. An interesting discussion of the matter as it concerns the Pacific area is recorded in the report of the Regional Education Seminar sponsored by the South Pacific Commission at Brisbane in 1959. (SPC Technical Paper No. 133.)

As regards the question of "how," much of the Brisbane session was devoted to a discussion of the structural approach to teaching languages and the use of the direct method. As regards the question of "when" to introduce the language, views range from those who believe that some circumstances justify use of the introduced language as the sole medium of instruction from the very beginning of formal schooling, to those who feel that it should first be introduced as a subject for study and should only become the medium of instruction gradually and at later stages.

Those whom circumstances incline to the former view will be interested in work which has been going on at the Special Centre, Nairobi, where a course in English has been devised for Asian children who begin their primary education through the medium of English without prior knowledge of that language. In due course this work will result in a new English course, "The Peak Series," published by Oxford University Press in association with the Special Centre. It is particularly interesting to note how this series fits in with much of the discussion at Brisbane; as mentioned, it is for use where the second language (in this case English) will be the medium of instruction right from the start; there is a great emphasis on oral work and the structural approach; and the use of English in teaching other subjects, e.g. arithmetic, history, nature study, etc., together with

appropriate vocabularies, is introduced as soon as possible.

It is emphasised that although the necessary testing of this work in actual school use has been going on for some years, it is only now possible to begin actual publication of the course, and not all parts are yet ready. Moreover, it has been designed to meet the needs of Asian school children in East Africa. Nevertheless, we felt it worthwhile bringing this important step forward to the notice of readers who will no doubt be able to obtain more information from the publishers.

TEXT BOOK DESIGN. In 1961 the National Book League in England sponsored an exhibition of text books which met the selectors' standards in three respects:

(i) The quality of artistic and typographical design, including the presentation of illustrations and diagrams.
(ii) Functional appropriateness of design to the book's educational purpose.
(iii) Appropriateness of price vis-à-vis the book's educational purpose.

The exhibition was of *design,* and not of "best" books. The only person competent to describe an educational book as "best" is the teacher who chooses whatever book is best fitted for use for a specific purpose with a partciular group of pupils. The exhibition was limited to books initiated and published in the United Kingdom between January, 1958, and April, 1960.

Some 98 books were accepted for exhibition, covering a wide range of school subjects from infant to secondary school level. The South Pacific Commission Literature Bureau has been able to obtain these for exhibition in its offices in Sydney, and visitors are very welcome to examine them.

SHORT STORY COMPETITION. On page 70 of the January issue of this *Bulletin* we referred to a short story competition sponsored by Messrs. Dominie (New Guinea) Ltd., publishers in Port Moresby. Winning entries have now been announced as follows:

First: A YOUNG HERO. By Anthony H. Rei, Department of Education, Wewak.

Second: THE STORY OF WANE. By Kwamala Kalo, Department of Education, Port Moresby.

Third: A SHORT STORY. By Udu Nou, Department of Native Affairs, Co-operative Section, Wewak.

The South Pacific Commission's Literature Bureau would be very glad to hear of any other writing competitions which may be organized in the South Pacific Area, and to give publicity to them in these columns if requested.

Papua And New Guinea Exports Set New Record

For the second year running, exports from Papua and New Guinea have reached a record level, with a total value of £18,819,915. Exports for the financial year 1959-60 showed an increase of 15.5% over the previous year's figure.

Main cause of the rise in export earnings was greater production of the territory's five main primary products—coconuts, cocoa, plywood and other timber, rubber and coffee.

Major increases included a 57.5% rise in the value of coffee shipped, 30.2% in rubber, 23.5% in plywood and other timber, 18.5% in copra and other coconut products, and 12.% in cocoa.

Papuan Attends Forestry School In Fiji

Recently a nineteen-year-old Papuan forestry field assistant, James Maraba, arrived at the Fiji Forestry Training School to take a one-year course. It is expected that on completing this he will be appointed to the staff of the forestry school to be established by the Administration at Bulolo for the training of Papuan and New Guinean forest rangers.

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These famous legends, one from the Netherlands and one from Britain, are the latest books in a series prepared for pupils learning English as a second language. In these present books all complicated sentence structures have been avoided and the vocabularies have been kept to 1,500 and 1,000 words respectively. Each book is illustrated. *The Tale of the Nibelungs 1s. 9d. The Knights of the Round Table 1s. 3d.*

★

CARE OF MOTHER AND BABY

C. ELAINE FIELD

Although prepared for Malaya, it is hoped that this book will be found useful in the Pacific. The simply-written text covers the care of the expectant mother and the management of the infant, and is very well illustrated with drawings, charts and tables. *2s. 6d.*

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Student-Farmer Scheme Launched In Fiji

(continued from page 25)

three-roomed houses for occupation by the student farmers. These cottages, which are 18′ by 16′, cost only £250 each. Each is shared by two trainees.

The student farmers, quick to accept their responsibilities as householders, have already added temporary kitchens, showers and latrines. They will provide more permanent structures later.

Six more houses, a workshop, and a recreation hall will be built later this year by the boys of Ratu Kadavulevu School.

Local Villagers Help

Neighbouring villagers assisted in the initial clearing of the site, while a local sawmiller used heavy equipment to clear away timber. An access road of thirty chains was constructed by the Public Works Department.

This co-operation has given the student farmers an excellent start, and they are responding well to the encouragement they have received. Each is farming a block of approximately eight acres, on which both subsistence crops and produce for sale are being grown. The latter includes bananas, coffee and cocoa. Each boy is also looking after forty-eight head of poultry.

The boys have been provided with working tools and household equipment, and receive a monthly allowance.

All produce from the farms, whether used for food by the students or sold for cash, will be carefully recorded and costed. Proceeds in the first year will go towards meeting the cost of purchasing poultry, stock and foodstuffs, and then towards the cost of marketing, including such items as packing cases and transport.

Savings Accounts For Students

The balance of the proceeds from each farm will be credited to the student in charge, and will be kept for him in a trust savings bank account. It is anticipated that in about seven years the farms will be fully productive, and will not need financial assistance.

The student farmers are being supervised by Mr. Garry Oughton, who was recruited by the Methodist Overseas Mission for the purpose. He is a University graduate in agricultural science, and in addition to his scientific training he has had considerable practical farming experience.

New School For Port Moresby

(continued from page 27)

demanded continuous load bearing reinforced concrete footings and load bearing isolated brick piers supporting steel pipe roof trusses. Corrugated galvanized iron roofing has been used over an insulating ceiling. Reinforced concrete floors are either laid on consolidated filling or—where suspended floors occur over undercrofts etc.—supported on reinforced concrete beams and isolated brick piers.

Generally, all isolated brick piers are 14″ x 14″ and have a 4½″ x 4½″ reinforced concrete core. External walls consist of either 11″ cavity brickwork or bays, or wooden window frames with low brick panels beneath. Internally, walls not covered with chalk or pin-up boards are of exposed brickwork. All walls and ceilings are in pleasing pastel colours.

Stabilized Earth Bricks Used

For the construction of the first stage of the school, 65,000 bricks were needed. To enable this quantity to be produced, a pilot brick-making plant, using five hand-operated machines, was installed at the Bomana Corrective Institution. Detainees were given the opportunity to learn at first hand the manufacturing technique of stabilized earth bricks[1].

The brick used was of standard size—9″ x 4½″ x 3″—composed of five parts clayey gravel, with one part cement as a stabilizer. Several different proprietary machines were used, but it was found that the "Tru-Line" brick-making machine, using a constant-pressure principle, provided the most satisfactory brick.

Tests on bricks for the school carried out by the Commonwealth Experimental Building Station at North Ryde, New South Wales, proved quite favourable. The Station recommended that the external face of all brickwork be painted with a suitable water-proofing paint to prevent possible weathering. Colourless paint containing silicone water-repellant compounds was therefore used. Twelve months after painting, the brickwork has not shown any evidence of weathering. (The colourless paint also preserves the pleasant salmon pink colour of the bricks.)

Estimated Costs

The total estimated cost of the project, excluding all movable items of furniture but including all special fittings for the various technical rooms, amounted to £A202,550. It was made up in the following way:

	£A
STAGE 1	
(a) Six classrooms and toilets	36,000
(b) Sports arena and hockey field	16,000
STAGE 2	
Science Unit and toilets	51,000
STAGE 3	
Administration and manual arts Units	50,800
STAGE 4	
(a) Four classrooms, assembly hall and toilets	47,200
(b) Tennis, basket and volley ball courts	1,550
Total	202,550

[1] It is hoped that the enthusiasm and willingness to learn being shown by the detainees will eventually be carried back to villages scattered throughout the territory. Thus, with assistance and guidance from the Administration, simple buildings will eventually be constructed by the indigenes and so a brick-making industry will be developed at village level.

In September, 1958, tenders were called for Stage 1, which was completed in August, 1959, at a total cost of £A51,940. The agreement reached between estimate and final cost leads to the hope that estimates of future stages are relatively correct, and are a sound foundation for the provision of finance.

The total floor area of Stage 1, including covered walkways, was 90 squares and the cost per square was £A480. (This does not include the cost of the sports arena and hockey field.)

The brick construction as used in Stage 1 has produced a building aesthetically pleasing and very comfortable in the tropical climate. The completed school buildings will be further enhanced when the sports arena and other surrounding grounds have been suitably landscaped. (This has been designed with a view to planting as many trees as possible among the natural white-barked eucalyptus.)

New Homes For Homeless Niueans

(continued from page 29)

in ten years, no further repayment is required.

To ensure that houses are built cheaply, quickly and with a minimum of supervision, simple and economical designs have been prepared by the architectural division of the New Zealand Ministry of Works. Simple plans and explanatory leaflets have also been prepared for use by unskilled labour.

Experienced building supervisors superintend groups of volunteer labourers using tools given by the Australian and Fijian Governments or bought with relief funds.

As well as providing neat and sturdy houses, the re-housing programme will have a number of incidental benefits. Layout and sanitation will be considerably improved, while overcrowding, which existed even before the hurricanes, will be eliminated.

PICTURE CREDITS

Acknowledgement is made for illustrations reproduced in this issue as follows: Front cover photo, pages 30, 31, 32, Jan Coenen; 18, Christchurch Press; 19, 20, 21, H. Coleman; 22, 23, 24, J. Ruinard; 25, 33, 41, 42, 58, 59, Fiji Official; 26, 27, 28, 37, 38, 50, 51, Australian Official; 44, 45, 46, 47, Winton Ryan; 55, A. A. Jaffe; 56, 57, Netherlands New Guinea Official; 69, University of Hawaii.

Engineering and mathematics students are provided with the latest laboratory equipment in Keller Hall, at the University of Hawaii.

Tupou Taunaolo, one of three East-West Center scholarship students from Fiji, leaves Bachman Hall, the University's administration building, for class.

Pacific Islanders Study At New East-West Center

Scholarship students from Asia, the Pacific Islands and the United States are now studying at the University of Hawaii's new East-West Center, which was established to promote understanding between the peoples of East and West. The number of scholarships available will increase each year, until in 1965 there will be two thousand two-year students at the Center.

By JUNE O. GOLDBERG

ONE hundred scholarship students from countries in Asia, the United States and the Pacific Islands are now studying at the University of Hawaii's new East-West Center.

Known formally as the Center for Cultural and Technical Interchange, the East-West Center was established late in 1960 at the University with grants from the United States Congress and the State of Hawaii. Its objective is to increase mutual understanding between the peoples of East and West. The Center includes the International College, the International Training Agency, and several Institutes.

Students in the International College actually study in one of the other seven colleges of the University of Hawaii on East-West Center scholarships.

2000 Scholarships By 1965

East-West Center Scholarships, most of them awarded for two-year periods, cover all expenses, including travel to and from Hawaii. Approximately 125 scholarships are available for the 1960-61 school year, another 250 for 1961-62. Scholarships will increase each successive year and by 1965 there will be 2000 two-year scholarship students at the East-West Center. Of this number 1600 will be from Asia, Australia, New Zealand and the Pacific Islands and 400 from the United States.

For seven years Hawaii has been the headquarters of the International Co-operation Center, which has provided in-service and on-the-job training for 3000 foreign participants. The I.C.C. will soon become the International Training Agency of the East-West Center. Through this Agency students will be offered programmes of observation, study, and in-service training ranging from short periods to two years in the following fields: Agriculture, community services, education, housing, labour, public administration, public health, public safety, supply services, social welfare, and transportation.

Further information regarding the East-West Center may be obtained from the Director, East-West Center, University of Hawaii, Honolulu 14, Hawaii.—Editor

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Agricultural Development In Micronesia

(continued from page 32)

to grow unhindered except that the native vegetation is not allowed to grow higher than the coconut palm crowns.

Records of beetle attack on all coconut trees are made at three-monthly intervals. There is already a trend showing increased beetle attack in the cleared plots.

Over 300 Breadfruit Cuttings Collected

During this mission I collected over three hundred root cuttings of breadfruit of thirty-six specially-selected varieties, in Guam and various islands of the United States Trust Territory, including Kapingamarangi Atoll, in the Caroline Group. The cuttings were sent by air to Tahiti, Fiji, and Western Samoa. The ready co-operation of agricultural stations made possible the prompt packing and despatch of this material, which recipient territories have since reported arrived in good condition.

EDITOR'S NOTE: For the October *Bulletin* Mr. Coenen is preparing an account of the work he carried out during his latest visit to Micronesia, and especially to Kapingamarangi Atoll, in collecting root cuttings of different varieties of breadfruit and arranging for their distribution by air to territories south of the Equator

South Pacific Commission Technical Papers

Copies of SPC Technical Papers, which as a general rule are published both in English and French editions, may be procured from the South Pacific Commission, Nouméa, New Caledonia, or G.P.O. Box 5254, Sydney, Australia. Except where otherwise stated, price per copy, post free by surface mail, is 2/- stg. (2/6 Aust., 2/3 Fijian, 30 cents U.S., 1 New Guinea guilder)*. The letters "E", "F", or "EF" in parenthesis at the end of each listing indicate present availability of titles in English and/or French editions.

NUTRITION

18. **Report on Nutrition Investigations by the South Pacific Commission in 1950.** November 1951. (EF).
22. **Chemical Composition of the Milk of New Hebridean Mothers.** F. E. Peters. February 1952. (F).
23. **Nutrition Research Conducted in New Hebrides during 1951.** Sheila Malcolm. April 1952. (E).
50. **Nutrition Investigation in New Caledonia.** Sheila Malcolm. October 1953. (E).
59. **Dietary and Nutritional Problems in the Pacific.** Dr. E. Massal. April 1954. (F).
63. **Diet and Nutrition in American Samoa.** Sheila Malcolm. August 1954. (E).
83. **Diet and Nutrition in the Trust Territory of the Pacific Islands.** Sheila Malcolm. July 1955. (E).
95. **Bibliography of the Nutritional Aspects of the Coconut.** F. E. Peters. September 1956. (EF).
100. **Chemical Composition of South Pacific Foods—An Annotated Bibliography.** F. E. Peters. January 1957. (6/- stg., 7/6A., 6/9F., $0.90, 3G.). (EF).
106. **Some Food Problems in the Pacific Islands.** H. S. McKee. May 1957. (EF).
113. **The Diet of Mothers and Children on the Island of Guam.** Sheila Malcolm. January 1958. (EF).
115. **The Chemical Composition of South Pacific Foods.** F. E. Peters. February 1958. (EF).
118. **Nutrition and the Papuan Child.** H. A. P. C. Oomen and S. H. Malcolm. April 1958. (8/- stg., 10/-A., 9/-F., $1.20, 4G.). (EF).

PUBLIC HEALTH

12. **Tuberculosis Investigations by the South Pacific Commission in 1950.** May 1951. (EF).
24. **A Survey of Leprosy on the Island of Nauru.** Dr. C. J. Austin. April 1952. (EF).
27. **A Survey of Leprosy in the British Solomon Islands Protectorate.** Dr. C. J. Austin. July 1952. (EF).
56. **Leprosy in Netherlands New Guinea.** Dr. Norman R. Sloan. April 1954. (EF).
57. **Leprosy in the Trust Territory of the Pacific Islands.** Dr. Norman R. Sloan. April 1954. (F).
62. **Leprosy in American Samoa.** Dr. Norman R. Sloan. July 1954. (E).
64. **Dental Conditions in School Children of American Samoa.** Dr. Raymond G. Neubarth. August 1954. (E).
67. **Ophthalmological Survey of the Trust Territory.** Dr. H. E. Crawford. September 1954. (E).
69. **Leprosy in Western Samoa and the Cook Islands.** Dr. Norman R. Sloan. October 1954. (E).
96. **Health Education in the South Pacific.** G. Loison and L. L. Keyes. November 1956. (EF).
131. **Dental Health in South Pacific Territories.** P. B. Cadell. August 1960. (EF).

MOSQUITO-BORNE DISEASES

17. **Conference of Experts on Filariasis and Elephantiasis, Tahiti: Summary of Proceedings.** September 1951. (EF).
33. **A Survey of Malaria in the British Solomon Islands Protectorate.** Dr. R. H. Black, November 1952. (EF).
60. **Some Aspects of Malaria in the New Hebrides.** Dr. R. H. Black. May 1954. (EF).
61. **Malaria in the Trobriand Islands.** Dr. R. H. Black. May 1954. (E).
65. **Annotated Bibliography of Filariasis and Elephantiasis.** September 1954. (5/- stg., 6/3A., 5/6F., $0.75, 2.50G.). (EF).
66. **Distribution of Filariasis in the South Pacific Region.** Dr. M. O. T. Iyengar. September 1954. (5/- stg., 6/3A., 5/6F., $0.75, 2.50G.). (EF).
68. **Malaria in the Torres Straits Islands.** M. Josephine Mackerras and Dorothea F. Sanders. October 1954. (E).
80. **Malaria Control and Research in Netherlands New Guinea.** Dr. R. H. Black. March 1955. (E).
81. **Malaria in the South-West Pacific.** Dr. R. H. Black. March 1955. (EF).
86. **Distribution of Mosquitoes in the South Pacific Region.** Dr. M. O. T. Iyengar. 1955. (8/- stg., 10/-A., 9/-F., $1.20, 4G.). (EF).
88. **Annotated Bibliography of Filariasis and Elephantiasis. Part 2.** Dr. M. O. T. Iyengar. January 1956. (6/- stg., 7/6A., 6/9F., $0.90, 3G.). (EF).
104. **Developmental Stages of Filariae in Mosquitoes.** Dr. M. O. T. Iyengar. May 1957. (EF).
105. **An Investigation on Filariasis in the Berau Region.** H. de Rook. May 1957. (EF).
109. **Annotated Bibliography of Filariasis and Elephantiasis. Part 3.** Dr. M. O. T. Iyengar. July 1957. (6/- stg., 7/6A., 6/9F., $0.90, 3G.). (EF).
110. **Enquete epidemiologique et entomologique sur la Filariose de Bancroft en Nouvelle-Caledonie et dependances.** M. Lacour et J. Rageau. (With Summary in English.) August 1957. (F).
117. **La repartition geographique des moustiques en Nouvelle-Caledonie et dependances.** J. Rageau. Mars 1958. (Available in French only.) (F).
119. **Enquete entomologique sur le Paludisme aux Nouvelle-Hebrides.** Jean Rageau et Guy Vervent. Janvier 1959. (Available in French only.) (F).
124. **Annotated Bibliography of Filariasis and Elephantiasis. Part 4.** Treatment. Dr. M. O. T. Iyengar. August 1959. (6/- stg., 7/6A., 6/9F., $0.90, 3G.). (E).
125. **Studies on the Epidemiology of Filariasis on Central and South Pacific Islands.** Elon E. Byrd and Lyle S. St. Amant. September 1959. (6/- stg., 7/6A., 6/9F., $0.90, 3G.). (EF).
126. **A Review of the Literature on the Distribution and Epidemiology of Filariasis in the South Pacific Region.** Dr. M. O. T. Iyengar. October 1959. (6/- stg., 7/6A., 6/9F., $0.90, 3G.). (E).
129. **Annotated Bibliography of Filariasis and Elephantiasis.** Part 5. Dr. M. O. T. Iyengar. June 1960. (6/- stg., 7/6A., 6/9F., $0.90, 3G.). (E).
130. **A Review of the Mosquito Fauna of the South Pacific.** Dr. M. O. T. Iyengar. July 1960. (6/- stg., 7/6A., 6/9F., $0.90, 3G.). (E).
132. **Summary Data on Filariasis in the Pacific.** Dr. M. O. T. Iyengar. August 1960. (EF).

TROPICAL CROPS

19. **Report on Copra Grading.** November 1951. (E).
21. **Note on the Mycoflora of Rice Seed in the Territories of the South Pacific.** Dr. F. Bugnicourt. January 1952. (F).
31. **Cocoa Plantation Management in Western Samoa.** D. R. A. Eden and W. L. Edwards. October 1952. (EF).
36. **Cocoa Growing in Fiji Islands.** D. H. Urquhart. December 1952. (E).
37. **Cocoa Growing in Netherlands New Guinea.** D. H. Urquhart. January 1953. (EF).
38. **Coffee Growing in New Caledonia.** D. H. Urquhart. January 1953. (E).
39. **Cocoa Growing in Western Samoa.** D. H. Urquhart. January 1953. (EF).
40. **Cocoa Growing in New Hebrides.** D. H. Urquhart. January 1953. (E).
48. **The Management of Coconut Plantations in Western Samoa.** D. R. A. Eden. September 1953. (EF).
55. **Grading of Fresh Fruit Exports from South Pacific Territories.** April 1954. (F).
82. **The Manufacture of Copra in the Pacific Islands.** W. V. D. Pieris. July 1955. (6/- stg., 7/6A., 6/9F., $0.90, 3G.). (EF).
87. **L'agriculture vivriere autochtone de la Nouvelle-Caledonie.** Jacques Barrau et Jean Guiart. Janvier 1956. (Available in French only.) (20/- stg.) (F).
94. **Food Plants of the South Sea Islands.** Dr. E. Massal and Jacques Barrau. September 1956. (6/- stg., 7/6A., 6/9F., $0.90, 3G.). (EF).
97. **Rice Production in the South Pacific Region.** R. Watson. October 1956. (EF).

PESTS AND DISEASES OF PLANTS AND ANIMALS

8. **Insect Pests in the Wallis Islands and Futuna.** F. Cohic. December 1950. (EF).

* Abbreviations used in the above list for the currencies quoted are: stg. (sterling); A (Australian); F (Fijian); $ (United States dollars); G. (New Guinea guilders).

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9. **Report of Plant and Animal Quarantine Conference, Suva.** April 1951. (EF).
34. **Rhinoceros Beetle Control in the Kingdom of Tonga.** L. J. Dumbleton. November 1952. (E).
77. **A List of Diseases and Parasites of Animals Recorded in the South Pacific Territories.** L. J. Dumbleton. December 1954. (EF).
78. **A List of Plant Diseases Recorded in South Pacific Territories.** L. J. Dumbleton. December 1954. (EF).
79. **A List of Insect Pests Recorded in South Pacific Territories.** L. J. Dumbleton. August 1955. (6/- stg., 7/6A., 6/9F., $0.90, 3G). (EF).
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29. **Current Research in the South Pacific in the Field of Economic Development.** July 1952. (E).
102. **Index of Social Science Research Theses on the South Pacific.** April 1957. (4/- stg., 5/-A., 4/6F., $0.60, 2G). (EF).
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42. **The Co-operative Movement in Papua and New Guinea.** Prepared by the Registry of Co-operative Societies, Port Moresby. February 1953. (EF).
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121. **Catalogue of the S.P.C. Co-operative Library.** January 1959. (Revised edition of T.P. 75.) (5/- stg., 6/3A., 5/6F., $0.75, 2.50G.). (EF).
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74. **Educational Aspects of Community Development.** R. Thomson. January 1955. (4/- stg., 5/-A., 4/6F., $0.60, 2G.). (EF).
84. **The Communities Project Approach to Economic Development.** H. Belshaw. July 1955. (EF).

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3. **The Village Library.** April 1950. (EF).
14. **Educational Broadcasts to Samoan Village Schools.** Department of Education, Western Samoa. May 1951. (EF).
15. **Libraries for Beginners.** Dr. and Mrs. Kenneth Todd, Kwato Mission, Eastern Papua. July 1951. (EF).
32. **Types of Organization in Adult and Mass Literacy Work.** D. B. Roberts. August 1952. (EF).
47. **Central Vocational Training Institution.** F. J. Harlow. August 1953. 5/- stg.; plans available sep. (5/- stg., 6/3A., 5/6F., $0.75, 2.50G.). (EF).
72. **Literacy Teaching for Adults.** Karel Neijs. November 1954. (5/- stg., 6/3A., 5/6F., $0.75, 2.50G.). (F).
73. **Educational Evaluation—A Documentary Survey.** J. C. Nield. December 1954. (EF).
99. **Education in the Pacific Islands—A Selected Bibliography.** C. Wedgwood. November 1956. (6/- stg., 7/6A., 6/9F., $0.90, 3G.). (EF).
114. **An Experimental Course in Adult Literacy.** Karel Neijs. January 1958. (EF).
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6. **A Preliminary List of Economic Plants of New Caledonia.** J. Barrau. July 1950. (EF).
7. **A Preliminary List of Plants Introduced into Tahiti.** July 1950. (F).
25. **Report of Fisheries Conference, Noumea.** May 1952. (EF).
28. **Coral as a Building Material.** July 1952. (EF).
30. **Bibliography of Cargo Cults and Other Nativistic Movements in the South Pacific.** Ida Leeson. July 1952. (EF).
41. **Social Problems of Non-Maori Polynesians in New Zealand.** Rev. R. L. Challis. February 1953. (EF).
53. **Reclamation of Tidal Mud Flats in Tonga.** W. Straatmans. March 1954. (F).
70. **A Linguistic Survey of the South-Western Pacific.** Dr. A. Capell. November 1954. (20/- stg., 25/-A., 22/6F., $3.00, 10G.). (F).
76. **A Bibliography of Tropical Housing.** January 1955. (F).
103. **How to Make Your Own Posters.** Nancy Phelan. May 1957. (2/6 stg., 3/3A., 2/9F., $0.40, 1.25G.). (EF).
108. **Practical Aspects of Weed-Killing by Chemicals in Tropical Crops.** E. J. E. Lefort. July 1957. (EF).
111. **A Selected Annotated Bibliography of Trochus.** R. Gail and L. Devambez. January 1958. (2/6 stg., 3/3A., 2/9F., $0.40, 1.25G.). (EF).
112. **Film and Filmstrip Catalogue.** (Revised edition of T.P. 71). January 1958. (3/- stg., 3/9A., 3/6F., $0.45, 1.50G.). (EF).
122. **Social Development in the South Pacific.** (Report of the Ninth Research Council Meeting.) February 1959. (EF).

Youth Group Meets At Port Moresby

(continued from page 28)

participants felt that young people could be considerably assisted through the development of social and recreational groups based on school affiliation and employment association as well as through the development of Youth Centres in towns where the size of the youth population is already constituting a problem and where, in view of the age structure of the population, the problem is likely to grow rather than to diminish.

Having reviewed these and other related problems and having had a fine opportunity for a valuable interchange of experience concerning their own communities' efforts to help youth, the members of the Study Group rounded out their discussions by considering ways in which the extent of the youth problem could be more accurately assessed so that through some co-ordinating effort the more urgent needs could be met through the combined resources of the local communities.

Study Group Participants

The Study Group participants were:

BRITISH SOLOMON ISLANDS PROTECTORATE: Mr. F. Osifelo, Mr. T. Russell.

GUAM: Mr. V. S. A. Benavente, Mr. F. A. Rivera.

NAURU: Rev. I. A. Amram, Mr. T. W. Star.

NETHERLANDS NEW GUINEA: Mr. O. Jufuay, Mr. F. Manupapami.

NEW CALEDONIA: Miss C. Flandre, Mr. T. Thupako.

NEW HEBRIDES (Joint Administration): Mr. P. Betsesai, Mr. J. Kalsal.

PAPUA AND NEW GUINEA: Mr. Muttu Gware, Mr. D. Lawrence, Mr. E. R. Safitoa, Mr. Ravu Sam.

UNITED STATES TRUST TERRITORY OF THE PACIFIC ISLANDS: Dr. E. K. Preterick, Mr. J. N. Remarii.

Trust Territory Dental Progress

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plies such as notebooks, pens and pencils are also provided, as is a modest sum each week for incidental needs. Everything, except clothing, is provided free.

At the end of the first junior year, students were provided during their vacation period with temporary jobs, which they accepted in preference to returning to their home districts. After graduation, they are assured of employment.

Mindful of the importance of a healthy body and personality, the faculty provides advisers to help with personal problems that may arise, and also sponsors group activities. Fishing trips, for example, have been arranged. With habits of healthful living these trained people will, as well as carrying out their professional duties, also set a valuable example in their communities.

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